

XXII. Hymenoptera Aculeata from Majorca (1901) and Spain (1901-2). By EDWARD SAUNDERS, F.R.S. With Introduction, Notes, and Appendix by Prof. EDWARD B. POULTON, F.R.S.

[Read June 1st, 1904.]

I. MAJORCA (1901).

THE Majorcan Aculeates named and described by Mr. Saunders in this memoir were collected by Mr. W. Holland, of the Hope Department, Oxford, Mr. A. H. Hamm, of the same Department, and myself. The entire collection was made from June 26 to July 12, 1901, in the neighbourhood of Palma, Soller and Pollensa, or in travelling between these places.

On returning home with many thousands of specimens belonging to nearly all groups, including those obtained in a week's hard work on the mainland, the expenditure of an immense amount of careful mechanical labour was necessary before the work of determination could begin. Interrupted by calls which could not be postponed, about eighteen months elapsed before I was in a position to submit the Aculeates to my kind friend, Mr. Edward Saunders, F.R.S., who has rendered such memorable help to the Hope Department on many occasions.

The Majorcan Aculeates numbered rather over 3680, and of these about 2500 were in the first instance examined by Mr. Saunders. The remaining specimens, which had been looked upon as duplicates of the commonest species, were subsequently studied by him, and a few species of interest recovered from among them.

It will be seen in his memoir that Mr. Saunders recognises five new species in this material:—*Pompilus poultoni*, *Mimesa pallidiarsis*, *Halictus dubitabilis*, *H. hollandi*, and *H. hammi*.

It is unnecessary again to describe the features of this beautiful island with its triple division into (1) level highly-cultivated plains, (2) mountains chiefly developed along the N.-W. coast, and (3) low marshy land on the N.-E. bordering parts of the bays of Alcudia and Pollensa.

After my first visit to Majorca in 1900 I gave some account of the main characteristics which appeal to the naturalist (*Ent. Monthly Magazine*, Sept. 1901, p. 205). All three types of country were included in the route taken in 1902, of which a brief account is given below.

June 26.—We landed at Palma in the morning after an all-night passage from Barcelona. In the afternoon we took the *Porti Pi* tram in order to visit the hill, on the summit of which *Bellver Castle* stands at a height of 400 ft. "This was the most favourable locality . . . met with during the visit in 1900" (*l.c.*, p. 206), and here I caught the fine new species of *Nomada* described by Mr. Edward Saunders (*l.c.*, pp. 209, 210). In July the conditions had greatly changed. The flowers were over and withered on the exposed surface, and the locality was not especially productive.

After collecting for a time, we descended the heath-covered southern slope and made our way to the coast, a little beyond *Porto Pi*, working the top and occasionally the face of the low cliffs beside the coast road running out of Palma in a S.-W. direction. Along this little strip of coast there was every degree of slope, while a considerable number of flowers were still to be found. Although it was late in the afternoon insects were fairly abundant and varied.

June 27.—The experience of the previous day induced us to make further trial of the coast beyond the tram terminus at *Porto Pi*. We explored the varied types of collecting ground to be found along the cliffs as far as the 6th kilometre on the coast road. At *Porto Pi* itself, and again at the furthest point, a little bay was found, with favourable ground running down to sea-level. At the 6th kilometre we explored part of a valley which ran inland from the bay. A fine rounded, heath-clad hill rising behind the cliffs was also traversed.

June 28.—Mr. Holland was ill and unable to walk. Mr. Hamm and I collected for 13 kilometres along the straight, level highway running S.-E. of Palma to *Lluchmayor*. We never wandered far from this glaring, dusty road, occupying most of the time upon the wayside flowers, where insects were abundant. Irrigation tanks, fields of lucerne, and on one occasion an old garden were also visited. The whole day's work lay in the fertile and highly-cultivated plain.

June 29.—During my visit in the previous year I had made a special note of the Pass of Soller, 22 kilometres from Palma, as likely to be a favourable locality. The varied character of the ground, the numerous plants, the high elevation above the Plain of Palma behind, and the Valley of Soller in front, the descent on both sides, the much higher ground readily accessible on either hand, all pointed to the Pass as a place in which a naturalist might well spend a few days.

We started to drive across the Plain of Palma towards the foot of the Pass, without any certainty that we should find a place to sleep in. When well out in the middle of the Plain we stopped at a neglected field covered with umbelliferous flowers and collected for an hour. I had specially bargained at the Fonda Mallorca for a most persuasive driver, who would do his best to induce the proprietress of the little inn on the summit to allow us to stay. He certainly acted up to his promise, and undeterred by repeated failure, plied every oratorical art for a considerable part of the afternoon. Although several times the hostess seemed to be upon the point of yielding she was finally inexorable. At last, however, she suggested that we should ask if we might stay at a neighbouring house—Son Allegra—where Señor Antonio Pascual resided. Here we were kindly received, and here our collection attracted the most lively interest and inquiry. In dumb show—for the Señor understood no English, and I only a word or two of Mallorquin—I was asked whether our captures were not intended to be stirred up in water and drunk as a medicine! The idea that insects were taken in order to be eaten or used as medicine was also met with many times in various parts of the island.

Towards the close of that afternoon we collected upon the summit of the Pass and the eastern slope rising from it.

June 30.—The whole of this day was occupied in working the summit and the slopes rising and descending from it.

July 1.—The steep southern slope leading from the summit to the Plain of Palma was explored from top to bottom, and a little work was done on the edge of the Plain.

July 2.—This day was passed like June 30, at and near the summit. I explored the high ground rising to the

west and found it favourable. Beyond the gardens of the few houses on this side of the Pass rose wooded slopes thinly covered with trees of medium size; beyond these cornfields were found bordered in certain parts by abundant flowers. Higher still was the bare mountain side; although even here the frugal islanders do not leave Nature to herself, for they turn out those most destructive of domestic mammals, goats and pigs.

July 3.—These western slopes rising high above the Pass seemed so favourable that we all spent July 3 in again exploring them.

July 4.—We left the Pass with regret. The view to the south of the vast Plain of Palma was a striking and beautiful contrast with that to the north,—the Valley of Soller shut in by steep hillsides, with the magnificent outline of the Piug Mayor, the highest mountain in the island, rising behind Soller itself in the centre of the picture.

The locality would probably be far more productive a little earlier in the year. Should any entomologist think of collecting there it will not be out of place to inform him that the only food consists of eggs, bread, fruit, coffee, and goats' milk. The fowls are not to be recommended.

We walked down the northern slope into Soller in the morning, collecting by the roadside. In the afternoon we worked between Soller and its Port, $2\frac{1}{2}$ miles distant, taking the majority of our captures from the flowers on the sides of the dry river-bed near the little town.

July 5.—All the baggage which could be dispensed with had been left in Palma, together with the captures made before June 29. The collections accumulated since the start for Soller Pass were loaded, with our very moderate supply of luggage, on the back of one mule, for the journey by mountain roads to Lluch and then Pollensa. As I watched the mass of boxes and bundles swaying from side to side and up and down, I was filled with needless fear for the safety of the specimens. The motion, with all its amplitude and rapidity, is so absolutely smooth and springy, and so devoid of sudden jerks, that not a single insect was displaced or in the slightest degree injured by the two days' journey.

Our course lay up the steep Barranco, above which some very fine upland collecting ground was traversed. In one flowery valley *Argynnis pandora* was seen in some numbers. It was only met with singly in other

localities in the island. At one point where a mountain stream formed a deep pool in a narrow rocky gorge, a species of *Notonecta* abounded in the water. Many an interesting and favourable locality made us regret that it was necessary to reach Lluch that night. We were kindly received, according to the hospitable traditions of the old-world monastic building, at the Colegio de Lluch.

July 6.—Before starting by the bridle-path for Pollensa we worked for about an hour in the broad valley near the building, and judging from this limited experience the locality appeared to provide better all-round collecting than any other place visited by us in the island.

When within a few miles of the ancient town a good deal of work was done in some flowery fields beside a stream. We arrived in time to visit Monte Sentuiri—a steep isolated hill which I had explored in 1900.

July 7.—This day was occupied in a walk to and from the Castillo del Rey. Many opportunities for good collecting were found in favourable spots by the path through the woods and here and there in the broad open valley beyond. Some of the mountain slopes near the ruined castle were clothed in a long coarse grass, all the more noticeable because of its scarcity in other places. Hopes, not destined to be fulfilled, were raised of the capture of *Erebias*.

July 8.—The day was occupied in a visit to the Port of Pollensa and in collecting on the low marshy ground, the Little Albufera, which borders the bay. Odonata were abundant by the irrigation ditches, and the flowers yielded a good harvest of insects. Much work was done in favourable spots by the side of the hot white road between Pollensa and its Port.

July 9.—The results of the 8th were so favourable, and the locality so different from any other we had visited, that it was determined to spend the last day at Pollensa at the Little Albufera. Much road-side collecting was done as on the 8th.

July 10.—We took the diligence to La Puebla and the train thence to Palma, arriving in time to spend the afternoon at Bellver Castle and the cliffs beyond Porto Pi as far as the 6th kilometre on the coast road, going over the ground explored on June 27.

July 11.—Up to this date there had been nothing but bright hot sun and cloudless skies. The change came on

the morning of the 11th, with a terrific downpour, which made us think that the weather had broken. In the afternoon, however, the sun shone as brightly as before, and we hastened to look for the insects which had been driven into cover by the dry heat of the previous days. We followed the route of the previous day, and Mr. Holland collected a fine assortment of species of *Blaps* under stones near Bellver Castle.

July 12.—On this, our last day in the island, we collected from the tram terminus at Porto Pi to the 6th kilometre on the coast road, returning in time to pack up and catch the boat which makes the night journey to Barcelona.

Reviewing the whole visit, it must be admitted that the weather was almost perfect, although a little more rain would probably have been advantageous. On the other hand, there can be no doubt that insects are far more abundant in species earlier in the summer. My visit to Majorca in the cold, cloudy and wet spring of 1900 was too early for the best results, ending as it did on April 4. Our visit in 1901 was too late. The withered remains of flowers in every direction gave some indication of favourable conditions which had passed away for the year, and although we searched for and found many of the late-blooming plants, it was obvious that these were very few as compared with the species whose flowering time was over. In spite of the poor weather the flowers were abundant and varied in March 1900, and included showy species which cover large areas, such as asphodel and various kinds of cistus. In the 1901 visit the flowers were generally of far less conspicuous kinds, and required to be sought for. I believe that May and the second half of April would be the best possible time for the entomologist in the Balearic Islands.

Sweeping was generally of little use, because of the hard prickly nature of the plants. Beating trees and shrubs in the evening was tolerably productive of the smaller moths.

In conclusion, it is a great pleasure to speak of the uniform kindness and hospitality of the people, and of their intense interest in the mysteries of the naturalist. Almost the whole population of the Port of Pollensa assembled to see us eat our simple lunch and look at the contents of the cyanide bottles; while at Pollensa an inquiry as to the Mallorquin names of insects produced a scene of wild excitement and dispute. Many an interesting and amus-

ing incident is recalled, and many a pleasant memory revived, by this attempt to write a brief account of our visit to Majorca.

EDWARD B. POULTON.

Oxford, July 9, 1904.

All the insects having been captured in 1901, it has not been considered necessary to make further reference to the year. The captors are indicated by their initials, E. B. P., W. H., and A. H.

CAMPONOTUS SICHELII, Mayr.

Little Albufera: *July 9.*—1 ♀ W. H.

CAMPONOTUS LATERALIS, Oliv., var.

Near Porto Pi: *July 10.*—1 ♀ W. H.

LASIVS NIGER, L.

Near Palma, Lluchmayor Road: *June 28.*—♂ and ♀ *in copulâ* A. H.

Soller Pass, below S. zigzags: *July 1.*—8 ♀ W. H.

Soller Pass, upper half of S. zigzags: *July 1.*—13 ♀ A. H.

Soller to Port: *July 4.*—1 ♀ winged A. H.

Little Albufera: *July 8.*—3 ♀. *July 9.*—19 ♀ W. H.

Road from Pollensa to Port: *July 9.*—2 ♀ W. H.

ACANTHOLEPIS FRAUENFELDII, Mayr.

Castle Bellver, 250-400 ft.: *June 26.*—1 ♀ A. H.

Near Porto Pi: *June 27.*—4 ♀ A. H. *July 12.*—1 ♀ E. B. P., 1 ♀ A. H.

MONOMORIUM SALOMONIS, L.

Near Porto Pi: *July 12.*—6 ♀ A. H.

Soller Pass, below S. zigzags: *July 1.*—1 ♀ A. H.

Upper half of S. zigzags: *July 1.*—1 ♀ A. H.

Soller to Port: *July 4.*—1 ♀ E. B. P.

APHENOGASTER STRUCTOR, Latr. ♀.

Castle Bellver, 250-400 ft.: *June 26.*—1 ♀ W. H.

Near Porto Pi: *June 27.*—10 ♀ E. B. P., 13 ♀ W. H., 12 ♀ A. H.

Near Palma, Lluchmayor Road: *June 28.*—5 ♀ A. H.

Plain of Palma, road to Soller: *June* 29.—4 ♀
W. H.

Soller Pass: *June* 29.—1 ♀ W. H. *June* 30.—1 ♀
W. H.

APHÆNOGASTER BARBARA, L.

Castle Bellver, 250–400 ft.: *June* 26.—1 ♀ W. H.

Little Albufera: *July* 8.—21 ♀ W. H.

APHÆNOGASTER TESTACEOPILOSA, Luc.

Near Porto Pi: *July* 12.—6 ♀ A. H.

PHEIDOLE MEGACEPHALA, F.

Soller Pass: *June* 29.—1 ♀ E. B. P.

Base of Monte Sentuiri: *July* 6.—3 ♀ W. H.

Pollensa: *July* 6.—2 ♂, 2 ♀, 90 ♀ A. H.

Little Albufera: *July* 9.—1 ♀ W. H.

CREMASTOGASTER SORDIDULA, Nyl.

Little Albufera: *July* 9.—2 ♀ W. H.

CREMASTOGASTER SCUTELLARIS, Oliv.

Near Porto Pi: *July* 11.—2 pairs *in copulá*, 6
winged 2 wingless ♀ E. B. P.; 5 pairs *in*
copulá, 7 winged ♀ W. H.; 2 pairs *in copulá*,
1 ♂, 15 ♀ (1 wingless), A. H.

Soller Pass, below S. zigzags: *July* 1.—1 ♀ A. H.

Soller Pass, upper half of zigzags: *July* 1.—1 ♀
A. H.

Soller Pass: *July* 2.—23 ♀ A. H.

CREMASTOGASTER SCUTELLARIS, race LÆSTRYGMON, Emery.

Castle Bellver, 250–400 ft.: *June* 26.—8 ♀ W. H.,
5 ♀ A. H. *July* 11.—1 ♀ E. B. P., 1 ♀ A. H.

Near Porto Pi: *June* 27.—1 ♀ E. B. P., 1 ♀
W. H., 15 ♀ A. H. *July* 10.—6 ♀ E. B. P.,
1 ♀ W. H. *July* 12.—1 ♀ W. H.

Soller Pass, upper half of zigzags: *July* 1.—1 ♀
A. H.

MUTILLA PARTITA, Klug.

Castle Bellver, 250–400 ft.: *June* 26.—2 ♂ A. H.

Near Porto Pi: *June* 27.—1 ♂ A. H. *July* 10.
—1 ♂ E. B. P., 1 ♂ W. H.

MYRMOSA COGNATA, Cost.

Soller Pass: *June* 30.—1 ♂ E. B. P.

MYZINE TRIPUNCTATA, Rossi.

Little Albufera: *July* 8.—1 ♂ W. H., 6 ♂ A. H.
July 9.—4 ♂ A. H.

MYZINE TRIPUNCTATA, var. NIGRIFRONS, Sm.

Near Porto Pi: *June* 27.—2 ♂ E. B. P., 1 ♂
A. H. *July* 12.—4 ♂ E. B. P., 3 ♂ W. H.,
2 ♂ A. H. Probably a variety of the preceding
with the clypeus black.

SCOLIA 4-PUNCTATA, F.

Abundant everywhere.

SCOLIA FLAVIFRONS, F.

Castle Bellver, 250–400 ft.: *June* 26.—1 ♂ E. B. P.,
1 ♂ W. H.

Near Porto Pi: *June* 27.—1 ♀ A. H.

Soller to Port: *July* 4.—1 ♂ A. H.

Road from Lluch to Pollensa: *July* 6.—3 ♂ A. H.

Little Albufera: *July* 9.—1 ♀ A. H.

POMPILUS (*Planiceps*) CASTOR, Kohl.

Near Porto Pi: *June* 27.—1 ♀ E. B. P.

Soller to Lluch: *July* 5.—1 ♂ A. H.

POMPILUS (*Pedinaspis*) OPERCULATUS, Klug.

Near Porto Pi: *June* 27.—3 ♀ E. B. P., 3 ♀
W. H., 1 ♂, 3 ♀ A. H. *July* 10.—1 ♂, 2 ♀
E. B. P., 4 ♀ W. H., 2 ♀ A. H. *July* 12.—
4 ♀ E. B. P., 2 ♀ W. H., 2 ♀ A. H.

Near Palma, Lluchmayor Road: *June* 28.—2 ♀
E. B. P., 1 ♀ A. H.

Plain of Palma, road to Soller: *June* 29.—1 ♀
W. H.

Soller Pass: *June* 30.—2 ♂, 1 ♀ E. B. P. *July* 2.
—1 ♀ W. H.

Soller Pass, upper half of S. zigzags: *July* 1.—
1 ♂ A. H.

Above Soller Pass: *July* 3.—1 ♀ A. H.

Pollensa to Castillo del Rey: *July* 7.—1 ♀ A. H.

Road from Pollensa to Port: *July 8.*—1 ♂, 2 ♀
 E. B. P., 5 ♀ W. H., 3 ♀ A. H. *July 9.*—
 1 ♀ E. B. P., 1 ♀ W. H., 3 ♀ A. H.
 Castle Bellver, 250–400 ft.: *July 11.*—1 ♀ A. H.

POMPILUS VIATICUS, L.

18 ♀, 9 ♂. *June 28 to July 9.*

[On *July 3*, above Soller Pass, a female of this species was found carrying a brown spider of very large size as compared with its captor. E. B. P.]

POMPILUS CHALYBEATUS, Schiödte.

Castle Bellver, 250–400 ft.: *June 26.*—1 ♂ E. B. P.
 Little Albufera: *July 8.*—2 ♀ E. B. P., 1 ♂ A. H.
July 9.—1 ♂, 3 ♀ A. H.
 Near Porto Pi: *July 10.*—1 ♂ E. B. P.

POMPILUS UNGUICULARIS, Thoms., var. (?).

Plain of Palma, road to Soller: *June 29.*—1 ♂
 A. H.
 Near Porto Pi: *July 12.*—1 ♂ W. H.

POMPILUS, sp. (?).

Above Soller Pass: *July 3.*—1 ♂ W. H.

POMPILUS, sp. (?).

Near Porto Pi: *July 10.*—1 ♀ W. H., 1 ♀ A. H.
July 12.—1 ♀ E. B. P.

POMPILUS EFFODIENS, Fert.

Castle Bellver, 250–400 ft.: *June 26.*—1 ♀ A. H.
 Near Porto Pi: *July 12.*—1 ♀ W. H.
 Road from Pollensa to Port: *July 8.*—1 ♀ A. H.

POMPILUS RUFIPES, L.

Soller Pass: *June 30.*—1 ♂ E. B. P.
 Above Soller Pass: *July 3.*—1 ♂ W. H.

POMPILUS COCCINEIPES, E. Saund.

Plain of Palma, road to Soller: *June 29.*—1 ♀
 A. H.

Described from Algerian specimens. I have not seen it from any other localities.

POMPILUS POULTONI, sp. nov.

Niger, capite thoraceque aureopubescentibus, mandibularum apicibus, abdomine toto, femoribus tibiisque posticis rufis; pronoto

postice margine angulatim emarginato, late pallido, metatarsis anticis 4 spinosis, unguiculis simplicibus.

♀. Black, apex of the mandibles, entire abdomen, posterior femora and tibiæ except at their bases and apices red, pronotum angularly emarginate at the base, the margin widely pale, wings with three submarginal cells.

♂ colour paler than in the ♀, abdomen with the apex and under-side of the basal segment and a spot on each side of the 2nd, apices of all the femora, the intermediate tibiæ and the anterior and posterior tibiæ on their under-sides testaceous, pronotum as in the ♀.

♀. Clypeus and the lower part of the face, especially at the sides and also behind the eyes, densely clothed with pale golden hairs, a similar pubescence covers the front of the pronotum, the pleuræ, the coxæ, the extreme base of the mesonotum, the sides of the scutellum and post-scutellum, and the whole of the propodeum; vertex with a few erect hairs, pronotum at the base sharply emarginate, its actual margin membranous, the pale band very narrowly and deeply sinuate in the centre, wings dusky with a darker apical band, 3rd submarginal cell triangular, in the wing of one specimen with a slight petiole; propodeum widely channelled down the centre, its surface very finely microscopically reticulate. Comb of anterior metatarsus with 4 short spines, claws simple throughout, 4th and 5th joints of posterior tarsi subequal.

Long. 7·8 m.m.

The ♂ which I have associated with this ♀ is exactly similar in the form of the prothoracic emargination and pale band, but is much worn, so that most of the pubescence has probably been lost; the 3rd submarginal cell of the wings is trapezoidal; the inner posterior calcar is four-fifths as long as the metatarsus; abdomen compressed laterally, but unfortunately in the only specimen captured the terminal segments are "telescoped" up, so that I cannot get a good view of their shapes.

Long. 5-6 m.m.

Soller Pass: *June* 30.—1 ♀ W. H. *July* 3.—1 ♂
A. H. Above Pass.

Soller to Lluch: *July* 5.—1 ♂ W. H.

Castle Bellver, 250-400 ft.: *July* 11.—1 ♂ E. B. P.

POMPILUS CINGULATUS, Rossi.

Near Porti Pi: *June* 27.—2 ♀ E. B. P. *July* 12.—
2 ♀ E. B. P., 2 ♀ W. H.

Near Palma, Lluchmayor Road: *June* 28.—1 ♀
A. H.

Soller Pass: *June* 30.—1 ♀ W. H.

Soller Pass, upper half of S. zigzags: *July* 1.—2 ♀
A. H.

Above Soller Pass: *July* 3.—1 ♂ W. H.

Soller to Lluch: *July* 5.—1 ♀ W. H., 2 ♀ A. H.

Road from Pollensa to Port: *July* 9.—1 ♀ E. B. P.

POMPILUS APICALIS, V. de L.

Soller Pass: *June* 29.—1 ♀ W. H.

Soller to Lluch: *July* 5.—1 ♀ A. H.

Base of Monte Sentuari: *July* 6.—1 ♀ A. H.

POMPILUS NIGER, F.

Little Albufera: *July* 8.—1 ♂, 2 ♀ A. H. *July*
9.—2 ♂ E. B. P.

POMPILUS APPROXIMATUS, Sm.

Soller to Lluch: *July* 5.—1 ♀ A. H.

Little Albufera: *July* 9.—1 ♀ A. H.

POMPILUS HOLOMELAS, Cost.

Soller Pass, upper half of S. zigzags: *July* 1.—
2 ♀ A. H.

Above Soller Pass: *July* 3.—1 ♀ E. B. P.

SALIUS BISDECORATUS, Cost.

Near Palma, Lluchmayor Road: *June* 28.—1 ♀
E. B. P.

Road from Pollensa to Port: *July* 8.—2 ♂, 3 ♀
E. B. P., 3 ♂, 2 ♀ W. H., 2 ♂ A. H. *July* 9.—
2 ♂, 7 ♀ E. B. P., 2 ♂, 8 ♀ W. H., 1 ♂, 8 ♀ A. H.

Little Albufera: *July* 8.—1 ♂ E. B. P., 1 ♂ A. H.
July 9.—1 ♂ W. H., 1 ♀ A. H.

[The two pairs of yellow spots on the abdomen of the female of this species produce with the general colouring and shape a remarkable superficial resemblance to the female of the excessively abundant *Scolia quadripunctata*. When at rest upon a flower the insects could only be distinguished by careful observation. The resemblance is doubtless synaposematic, like that which obtains between the South African *Scolia alaris* and the *Diploptera*. (Trans. Ent. Soc. Lond., 1902, pp. 527-529.) Mr. A. H. Hamm

first pointed out this interesting example of Müllerian mimicry to me, and we both subsequently noticed it on several occasions. E. B. P.]

SALIUS, sp. (?).

Soller Pass: *June 30.*—1 ♀ A. H.

SALIUS PUSILLUS, Schiödte.

Soller Pass, upper half of *S. zigzags*: *July 1.*—
1 ♀ A. H.

SALIUS PROPINQUUS, Lep.

Above Soller Pass: *July 3.*—1 ♀ E. B. P.

PSEUDAGENIA ALBIFRONS, Dhl.

Soller to Lluch: *July 5.*—1 ♀ E. B. P.

Lluch: *July 6.*—1 ♀ A. H.

PSEUDAGENIA CARBONARIA, Scop.

Soller Pass: *June 29.*—1 ♂ A. H. *June 30.*—1 ♀
E. B. P.

Above Soller Pass: *July 3.*—1 ♀ W. H., 1 ♀ A. H.

Soller Pass: *July 1.*—1 ♀ E. B. P.

Upper half of *S. zigzags*: *July 1.*—1 ♀ W. H.

CEROPALES MACULATUS, F.

Soller Pass: *June 30.*—2 ♀ W. H.

Road from Lluch to Pollensa: *July 6.*—1 ♀ W. H.

Little Albufera: *July 8:*—1 ♀ W. H. *July 9.*—
1 ♀ A. H.

ASTATA BOOPS, Schr.

Soller Pass: *June 30.*—1 ♂ W. H.

Soller Pass, upper half of *S. zigzags*: *July 1.*—
1 ♂ A. H.

Pollensa to Castillo del Rey: *July 7.*—1 ♀ E. B. P.,
1 ♀ A. H.

NOTOGONIA POMPILIFORMIS, Pz.

Soller Pass: *June 30.*—1 ♀ A. H.

Road from Pollensa to Port: *July 8.*—1 ♀ A. H.
July 9.—1 ♀ E. B. P.

TACHYSPHEX NITIDUS, Spin.

Near Porto Pi: *June 27.*—1 ♀ E. B. P.

Plain of Palma, road to Soller: *June 29.*—1 ♂
E. B. P.

Little Albufera: *July* 8.—1 ♀ A. H. *July* 9.—
1 ♀ A. H.

Road from Pollensa to Port: *July* 8.—1 ♀ W. H.,
2 ♀ A. H. *July* 9.—1 ♀ A. H.

Near Porto Pi: *July* 12.—1 ♀ E. B. P.

Some of these specimens differ considerably from others by the wide, smooth, almost impunctate space just above the anterior margin of the clypeus. I sent one of these to Prof. Kohl of Vienna, but he considers it merely as a variety of this species.

TACHYSPHEX, sp. (?) nr. *nitidus*.

Castillo del Rey: *July* 7.—1 ♀ A. H.

Puncturation of mesonotum finer and closer than in *nitidus*.

TACHYSPHEX FILICORNIS, Kohl.

Near Porto Pi: *July* 10.—1 ♂ W. H., 1 ♀ A. H.
July 12.—1 ♀ W. H.

TRYPOXYLON ATTENUATUM, Sm.

Above Soller Pass: *July* 3.—1 ♂ A. H.

Pollensa Castillo del Rey: *July* 7.—1 ♀ A. H.

Near Porto Pi: *July* 12.—1 ♂ E. B. P.

PSAMMOPHILA HIRSUTA, Scop.

32 ♂, 12 ♀. *June* 26 to *July* 10.

PSAMMOPHILA TYDEI, Guill.

Near Porto Pi: *June* 27.—1 ♂ W. H. *July* 10.—
1 ♂ A. H. *July* 12.—2 ♂ E. B. P., 2 ♂ W. H.,
1 ♂, 1 ♀ A. H.

Near Palma, Lluchmayor Road: *June* 28.—1 ♂, 1 ♀
E. B. P., 2 ♂, 2 ♀ A. H.

Soller to Port: *July* 4.—1 ♂, 1 ♀ E. B. P.

Road from Pollensa to Port: *July* 8.—1 ♀ A. H.

Little Albufera: *July* 8.—1 ♂ E. B. P., 1 ♂
W. H., 2 ♀ A. H. *July* 9.—1 ♂, 2 ♀ E. B. P.,
1 ♂ A. H.

SPHEX VIDUATUS, Chr.

Near Porto Pi: *June* 27.—1 ♀ E. B. P. *July* 12.
—1 ♂ E. B. P., 1 ♂ W. H.

This is far from being a common species, but occurs in Algeria and S. Europe.

SPHEX SUBFUSCATUS, Dhl.

Near Palma, Lluchmayor Road: *June* 28.—1 ♀
E. B. P.

Above Soller Pass: *July* 3.—1 ♂ A. H.

Soller to Port: *July* 4.—1 ♂ A. H.

Road from Pollensa to Port: *July* 9.—1 ♀ W. H.

Castle Bellver, 400 ft.: *July* 11.—1 ♂ E. B. P.

SPHEX FLAVIPENNIS, F.

Castle Bellver, 250–400 ft.: *June* 26.—1 ♀ A. H.

Soller Pass: *June* 30.—1 ♂ E. B. P. *July* 1.—1 ♀
E. B. P. *July* 2.—1 ♂, 1 ♀ A. H.

Above Soller Pass: *July* 3.—1 ♀ A. H.

Pollensa to Castillo del Rey: *July* 7.—2 ♀ E. B. P.

SCELIPHRON PENSILIS, Ltr.

Lluch: *July* 6.—1 ♂ A. H.

Lluch to Pollensa: *July* 6.—1 ♀ W. H.

Pollensa to Castillo del Rey: *July* 7.—1 ♀ W. H.,
2 ♀ A. H.

Pollensa to Port: *July* 8.—1 ♀ E. B. P. *July* 9.
—1 ♂ E. B. P.

Near Porto Pi: *July* 12.—1 ♂ W. H.

SCELIPHRON SPIRIFEX, L. Common.

[Wherever mud was found these insects were seen collecting it for making their nests.

Both this species and the preceding, which is indistinguishable from it on the wing, present a very peculiar appearance during flight. The pale yellow parts of body and legs become invisible, while the black areas are extremely conspicuous. The limbs are probably so held during the flight of the insect that their yellow sections come beneath the median yellow of the body. However this may be the terminal black parts seem to be completely detached, suggesting the appearance of two insects, one pursuing the other, or a predaceous species carrying its prey. E. B. P.]

MIMESA PALLIDITARSIS, sp. nov.

Nigra, palpis, tibiaram posticarum basibus, tarsis-que omnibus flavis, capite thoraceque plus minus dense punctatis, antennarum articulis subtus valde carinatis, abdominis petiolo carinato, postpetiolo longiore.

♂. Black; the palpi, the extreme apex of all the tibiæ, the base of the posterior pair and all the calcaria and tarsi pale, the extreme apices of the femora pitchy, face densely clothed with silvery hairs with a slight golden tinge, vertex very densely and closely punctured, joints of the flagellum strongly carinated beneath, scape swollen, about equal in length to the 2nd joint of the flagellum, mesonotum shining, clothed with a sparse grey pubescence, deeply and somewhat closely punctured, the puncturation very close in front, less so on the disc and sides, where in certain positions indications of longitudinal rugosities can be seen, post-scutellum exceedingly finely and closely punctured, mesopleuræ finely punctured, sides of the metapleuræ and propodeum diagonally striate, propodeum above largely reticulate, its basal area very shining with a few large somewhat radiating costæ, wings slightly dusky, tegulæ and nervures piceous, legs sparingly clothed with greyish hairs; petiole of the basal segment of the abdomen longer than the post-petiole, clothed with long erect grey hairs, central keel slightly widening near its base, rest of the abdomen shining, finely and remotely punctured, clothed with very short greyish hairs, which are more conspicuous on the apices of the segments laterally; apical process of 8th segment testaceous.

Long. 7.8 mm.

Little Albufera: *July* 9.—1 ♂ E. B. P., 1 ♂ W. H.,
2 ♂ A. H.

PEMPHREDON SHUCKARDI, Mor.

Little Albufera: *July* 9.—1 ♂ W. H.

PEMPHREDON LETHIFER, Shuck.

Soller Pass: *July* 2.—1 ♀ A. H.

Little Albufera: *July* 9.—1 ♀ A. H.

DIODONTUS FRIESEI, Kohl.

Near Palma, Lluchmayor Road: *June* 28.—1 ♂
A. H., 1 ♂ E. B. P.

Described from specimens from Palestine. Prof. Kohl has seen one of the specimens, and agrees in considering it as belonging to this species.

DIODONTUS MINUTUS, Fab.

Near Porto Pi: *July* 10.—1 ♀ E. B. P.

PASSALGECUS INSIGNIS, V. de L.

Road from Pollensa to Port: *July* 8.—1 ♂ A. H.

GORYTES LÆVIS, Ltr.

Soller Pass: *June* 30.—1 ♀ W. H.

Near Porto Pi: *July* 12.—1 ♀ E. B. P.

GORYTES LATIFRONS, Spin.

Soller to Lluch: *July* 5.—1 ♀ A. H.

BEMBEX OCVLATA, Ltr.

Near Porto Pi: *July* 10.—1 ♀ E. B. P., 1 ♂ A. H.

July 12.—4 ♂ E. B. P., 1 ♀ W. H., 1 ♀ A. H.

[Flying very rapidly over the wet sand at the bottom of the little inlet. E. B. P.]

STIZUS TRIDENS, F.

Near Porto Pi: *June* 27.—1 ♂ A. H. *July* 12.—

1 ♂ E. B. P., 1 ♀ A. H.

Soller to Port: *July* 4.—2 ♂ A. H.

PHILANTHUS TRIANGULUM, F.

June 26 to *July* 11.—49 ♂, 45 ♀.

[The females were often seen carrying bees to their nest, especially at Soller Pass, where a colony had excavated burrows in a heap of road scrapings. E. B. P.]

CERCERIS ARENARIA, L.

Abundant.

CERCERIS 4-CINCTA, V. de L.

Near Porto Pi: *June* 27.—3 ♂ E. B. P., 1 ♂ W. H.

July 10.—1 ♀ A. H. *July* 12.—4 ♀ A. H.

Near Palma, Lluchmayor Road: *June* 28.—2 ♂

E. B. P., 5 ♂, 1 ♀ A. H.

Plain of Palma, road to Soller: *June* 29.—2 ♀ A. H.

Soller Pass: *June* 30.—1 ♂, 1 ♀ E. B. P. *July* 2.

—3 ♂ W. H., 1 ♀ A. H., 1 ♂ E. B. P. Upper

half of S. zigzags: *July* 1.—1 ♀ E. B. P.,

5 ♂ A. H. Below S. zigzags: *July* 1.—1 ♂ W. H.

Soller to Lluch: *July* 5.—1 ♀ E. B. P.

Lluch: *July* 6.—1 ♂, 1 ♀ E. B. P.

Road from Lluch to Pollensa: *July* 6.—1 ♂ A. H.

Pollensa to Castillo del Rey: *July 7.*—1 ♂ E. B. P.
 Road from Pollensa to Port: *July 8.*—1 ♂ E. B. P.
 Castle Bellver: *July 11.*—2 ♂ A. H.

CERCERIS FERRERI, V. de L.

Castle Bellver, 250–400 ft.: *June 26.*—1 ♂ E. B. P.
 Near Porto Pi: *June 27.*—1 ♂ E. B. P., 2 ♂, 1 ♀
 A. H.
 Near Palma Lluchmayor Road: *June 28.*—1 ♂
 A. H.
 Soller Pass: *June 30.*—3 ♂, 2 ♀ E. B. P. *July*
1.—1 ♀ E. B. P. *July 2.*—1 ♂ A. H.
 Soller Pass, upper half S. zigzags: *July 1.*—1 ♂
 A. H.
 Above Soller Pass: *July 3.*—1 ♀ A. H.
 Soller to Port: *July 4.*—1 ♂ A. H.
 Little Albufera: *July 8.*—1 ♀ E. B. P., 1 ♀ A. H.

CERCERIS EMARGINATA, Pz.

♂ and ♀ common.

OXYBELUS LAMELLATUS, Oliv.

Little Albufera: *July 9.*—1 ♀ W. H.

CRABRO HYPSEÆ, de Stef. ♀, *punctatus*, H.-Sch. (nec Lep.?).

Soller to Lluch: *July 5.*—1 ♀ A. H.
 Road from Pollensa to Port: *July 9.*—1 ♀ W. H.
 Near Porto Pi: *July 10.*—1 ♀ B. P.

For this determination I am indebted to Prof. Kohl, who tells me that it is certainly *hypsæ* of de Stefani, and certainly *punctatus*, H.-Schaeffer, but that it is doubtful if it is the *punctatus* of Lepeletier.

CRABRO VAGUS, L., var. *sulphuripes*, Sm.

Plain of Palma, road to Soller: *June 29.*—3 ♂, 1 ♀
 A. H., 1 ♂ W. H.
 Soller Pass: *June 30.*—2 ♂ W. H. *July 2.*—2 ♂
 W. H. Upper half of S. zigzags: *July 1.*—
 1 ♂ W. H. Below S. zigzags: *July 1.*—1 ♂
 W. H.
 Little Albufera: *July 9.*—1 ♂ E. B. P., 1 ♂ W. H.

CRABRO ELONGATULUS, V. de L., var. *femoribus anticis
 subtus barbatis.*

Near Palma, Lluchmayor Road: *June 28.*—2 ♂,
 1 ♀ E. B. P., 1 ♂, 2 ♀ A. H.

CRABRO 5-NOTATUS, Jur.

Soller to Lluch: *July* 5.—2 ♀ A. H.

VESPA GERMANICA, F.

Soller Pass: *June* 30.—1 ♀ W. H. *July* 1.—1 ♀
E. B. P.

Above Soller Pass: *July* 2.—1 ♀ E. B. P.

Soller to Port: *July* 4.—1 ♀ E. B. P.

[The rarity of this species was noteworthy. Only females were seen. E. B. P.]

POLISTES GALLICA, L.

Abundant everywhere.

[After *Halictus scabiosæ*, this was the most abundant Aculeate in the island. E. B. P.]

EUMENES COARCTATA, L.

Fairly abundant everywhere.

RHYNCHIUM OCULATUM, F.

Soller to Port: *July* 4.—1 ♂ E. B. P., 1 ♂ A. H.

Pollensa, on vine behind Fonda: *July* 7.—1 ♀
W. H.

Pollensa to Castillo del Rey: *July* 7.—1 ♂ W. H.,
2 ♂, 2 ♀ A. H.

Little Albufera: *July* 9.—1 ♀ A. H.

ODYNERUS DANTICI, Rossi, var.

Near Porto Pi: *June* 27.—1 ♂ E. B. P., 1 ♂ A. H.

July 10.—1 ♂ W. H. *July* 12.—1 ♂, 2 ♀
E. B. P., 3 ♂ W. H.

Near Palma, Lluchmayor Road: *June* 28.—1 ♂, 1 ♀
E. B. P., 1 ♀ A. H.

Soller Pass: *June* 30.—1 ♂ E. B. P., 1 ♂ W. H.
July 2.—1 ♂ A. H.

Little Albufera: *July* 8.—2 ♀ E. B. P.

A rather small form of this very variable species.

ODYNERUS SIMPLEX, F.

Castle Bellver, 250–400 ft.: *June* 26.—1 ♂ W. H.

Soller Pass, below S. zigzags: *July* 1.—1 ♀ E. B. P.,
1 ♂ A. H.

Road from Lluch to Pollensa: *July* 6.—1 ♂ A. H.

Road from Pollensa to Port: *July* 8.—1 ♀ W. H.,
1 ♀ A. H. *July* 9.—1 ♀ A. H.

ODYNERUS PARIETUM, Linn.

Abundant.

ODYNERUS PARIETUM, Linn., var. *renimacula*.

Soller Pass: *June* 30.—1 ♀ A. H. Upper half
of S. zigzags: *July* 1.—1 ♀ A. H. Below
S. zigzags: *July* 1.—3 ♀ E. B. P., 1 ♀ W. H.
Above Soller Pass: *July* 3.—1 ♂ W. H.

[This variety was thus, within the limits of our experience, confined to the vicinity of Soller Pass. E. B. P.]

ODYNERUS ALPESTRIS, Sauss.

Castle Bellver, 250–400 ft.: *June* 26.—2 ♀ A. H.
Near Porto Pi: *June* 27.—2 ♀ W. H., 2 ♀ A. H.
July 10.—2 ♂, 2 ♀ E. B. P., 3 ♀ A. H. *July*
12.—2 ♂, 3 ♀ E. B. P., 2 ♂, 3 ♀ W. H., 2 ♂, 2 ♀
A. H.

ODYNERUS SICULUS, de Stef. (?)

Road from Pollensa to Port: *July* 8.—1 ♂ E. B. P.
July 9.—1 ♀ A. H.
Near Porto Pi: *July* 10.—1 ♂ A. H. *July* 12.—1
♀ E. B. P., 1 ♂ W. H., 3 ♂, 1 ♀ A. H.
Castle Bellver, 250–400 ft.: *July* 11.—1 ♂ A. H.

PROSOPIS VARIEGATA, F.

Castle Bellver, 250–400 ft.: *June* 26.—1 ♂, 2 ♀
E. B. P., 2 ♂, 6 ♀ W. H., 1 ♀ A. H. *July* 11.—
1 ♀ W. H., 1 ♂, 1 ♀ A. H.
Near Porto Pi: *June* 27.—1 ♂ E. B. P., 2 ♂, 2 ♀
A. H. *July* 11.—1 ♀ W. H.
Near Palma, Lluchmayor Road: *June* 28.—1 ♀
E. B. P.
Base of Monte Sentuiri: *July* 6.—1 ♀ A. H.

PROSOPIS MASONI, Ed. Saund.

Castle Bellver, 250–400 ft.: *June* 26.—1 ♂ E. B. P.,
1 ♂ A. H.
Near Porto Pi: *June* 27.—1 ♂ A. H. *July* 12.—
1 ♂, 1 ♀ A. H.
Near Palma, Lluchmayor Road: *June* 28.—1 ♀
E. B. P.
Soller Pass: *June* 30.—1 ♀ E. B. P.
Above Soller Pass: *July* 3.—1 ♀ E. B. P.

Lluch : *July* 6.—1 ♀ W. H.

Road from Lluch to Pollensa : *July* 6.—1 ♂
E. B. P., 2 ♀ A. H.

Pollensa to Castillo del Rey : *July* 7.—2 ♂, 1 ♀
E. B. P., 2 ♂, 7 ♀ A. H.

Road from Pollensa to Port : *July* 8.—1 ♂ W. H.

PROSOPIS PICTA, Sm.

Soller Pass : *June* 30.—1 ♀ W. H.

Soller to Port : *July* 4.—1 ♂ E. B. P., 1 ♂ A. H.

Soller to Lluch : *July* 5.—1 ♀ E. B. P.

Little Albufera : *July* 9.—1 ♂ W. H.

PROSOPIS CLYPEARIS, Schenck.

Near Porto Pi : *June* 27.—1 ♂ A. H. *July* 12.—
1 ♀ A. H.

Soller to Lluch : *July* 5.—1 ♂ W. H., 2 ♀ A. H.

Pollensa to Castillo del Rey : *July* 7.—1 ♀ E. B. P.,
2 ♀ A. H.

Road from Pollensa to Port : *July* 8.—1 ♀ W. H.

PROSOPIS PICTIPES, Nyl.

Castle Bellver, 250-400 ft. : *June* 26.—1 ♀ W. H.

Soller Pass : *June* 30.—1 ♀ A. H.

Near Porto Pi : *July* 12.—1 ♂ E. B. P.

PROSOPIS IMPARILIS, Först.

Road from Lluch to Pollensa : *July* 6.—1 ♂ A. H.

Pollensa to Castillo del Rey : *July* 7.—2 ♂ E. B. P.,
2 ♂ A. H.

SPHECODES GIBBUS, L., var.

Palma, Road to Lluchmayor : *June* 28.—4 ♂ E. B. P.,
1 ♂ 1 ♀ A. H.

Soller Pass : *June* 29.—1 ♂ W. H. *June* 30.—2 ♂
A. H. *July* 1.—1 ♀ E. B. P. *July* 2.—1 ♂
A. H.

Above Soller Pass : *July* 3.—1 ♂ A. H.

Soller to Port : *July* 4.—2 ♂ A. H.

Soller to Lluch : *July* 5.—1 ♂ W. H., 1 ♀ A. H.

Pollensa to Castillo del Rey : *July* 7.—2 ♂ A. H.

Near Porto Pi : *July* 10.—1 ♂ A. H. *July* 12.—
2 ♂ E. B. P., 5 ♂ W. H.

In all the specimens the abdomen is entirely red, and the posterior tibiæ red in both sexes. The armature, however, is that of typical *gibbus*.

SPHECODES SUBQUADRATUS, Sm.

Common.

SPHECODES PUNCTICEPS, Thoms.

Near Porto Pi: *June* 27.—1 ♂ A. H. *July* 12.—
1 ♂ E. B. P.

Soller Pass, upper half of S. zigzags: *July* 1.—1 ♀
E. B. P.

Pollensa to Castillo del Rey: *July* 7.—1 ♂ A. H.
Road from Pollensa to Port: *July* 9.—1 ♂ A. H.

HALICTUS SCABIOSÆ, Rossi, ♂ ♀, and var. *ochraceovittatus*,
Dours.

Abundant everywhere.

The majority of the ♂♂ belong to the smaller form, which I believe to be identical with *ochraceovittatus*, Dours.

[This was by far the most abundant Aculeate in the island. E. B. P.]

HALICTUS SEPARANDUS, Schm.

Castle Bellver, 250–400 ft.: *June* 26.—1 ♂ E. B. P.,
1 ♀ W. H., 1 ♂ A. H.

Near Porto Pi: *June* 27.—1 ♀ E. B. P. *July* 10.—
1 ♂ E. B. P. *July* 12.—1 ♀ W. H., 1 ♂ A. H.

Near Palma, Lluchmayor Road: *June* 28.—2 ♂
A. H.

Lluch: *July* 6.—1 ♂ A. H.

HALICTUS MALACHURUS, Kirb.

Abundant.

HALICTUS VILLOSULUS, Kirb.

Pollensa to Castillo del Rey: *July* 7.—3 ♂ E. B. P.

Near Porto Pi: *July* 12.—1 ♂ E. B. P.

HALICTUS BREVICORNIS, Schk.

Soller Pass, upper half of S. zigzags: *July* 1.—1 ♀
E. B. P.

Soller Pass: *July* 2.—1 ♀ A. H.

Above Soller Pass: *July* 3.—2 ♀ A. H.

Soller to Lluch : *July 5.*—1 ♀ A. H.

Road from Lluch to Pollensa : *July 6.*—1 ♀ A. H.

Pollensa to Castillo del Rey : *July 7.*—2 ♀ A. H.

These specimens are slightly different from those of this species which occur further north, in having the puncturation of the mesonotum stronger and more regular.

HALICTUS PUNCTATISSIMUS, Mor.

Near Porto Pi : *June 27.*—1 ♂ E. B. P.

Near Palma, Lluchmayor Road : *June 28.*—1 ♂
A. H.

Soller Pass, upper half of S. zigzags : *July 1.*—1 ♂
A. H.

Soller to Lluch : *July 5.*—1 ♂ A. H.

HALICTUS DUBITABILIS, sp. nov.

H. punctatissimo affinis, sed multo minor, ♂ capite valde elongato clypeo minus producto, antennis pallidis, ♀ capite brevior clypeo minus producto, propodeo nitidior striis basalibus brevioribus, distinctus.

♂. Face very elongate, about twice as long as its greatest width between the eyes, antennæ long, reaching, when the head is in a horizontal position, to about the apex of the propodeum, the joints of the flagellum longer than wide, slightly swollen beneath, testaceous and scarcely black even posteriorly. Mesonotum nearly dull, closely punctured propodeal area radiately rugose, wing nervures and tegulæ pale testaceous, legs clothed with greyish-white hairs, abdomen slightly shining closely and distinctly punctured on the 1st and 2nd segments, indefinitely on the rest, beneath with a few longish hairs on the discs of the segments.

♀ exceedingly like a diminutive *punctatissimus* but the face is rather shorter, the clypeus not being so much produced; the mesonotum is duller and rather more closely punctured, the propodeum more shining with more regular and shorter longitudinal striæ at the base, beyond which the brow is smooth and shining, its apical margin subtruncate, abdomen punctured much as in *punctatissimus*.

Long. 5 m.m.

A species with the general facies of *punctatissimus* but much smaller, black, clothed sparingly with greyish-white hairs, the ♂ with the antennæ beneath, the apex of the clypeus, the labrum, mandibles, the tibiæ at their base and apex and the tarsi pale testaceous.

- Near Palma, Lluchmayor Road: *June* 28.—2 ♂
A. H.
Road from Lluch to Pollensa: *July* 6.—1 ♂ A. H.
Pollensa to Castillo del Rey: *July* 7.—3 ♀ A. H.
Road from Pollensa to Port: *July* 8.—9 ♂ E. B. P.,
1 ♂ W. H., 4 ♂ 1 ♀ A. H.
Little Albufera: *July* 8.—1 ♀ W. H., 1 ♀ A. H.
July 9.—1 ♂ 1 ♀ W. H., 1 ♀ E. B. P.
Near Porto Pi: *July* 10.—1 ♂ W. H. *July* 12.—
2 ♂ A. H.

HALICTUS HOLLANDI, sp. nov.

H. minutissimo affinis, facie longiore, mesonoto minus dense punctato nitidior, antice linea longitudinali brevior minus fortiter impressa, abdominis segmento basali punctato, distinguendus.

♂ black, apex of clypeus, labrum and mandibles flavous, antennæ beneath, tegulæ and the base of the tibiæ pale, tarsi more or less piceous, head rather shining, strongly punctured, face rather elongate, clothed with white pubescence, clypeus scarcely produced, antennæ somewhat thick, the joints slightly swollen. Mesonotum shining, seen under a strong lens to be microscopically rugulose, not closely but distinctly and rather finely punctured, propodeum rounded posteriorly its brow rather callous and shining, basal area impressed and irregularly and longitudinally rugose, wings hyaline, nervures brown, legs clothed with white hairs; abdomen shining, sparingly clothed, especially at the sides and apex, with short white hairs. Apices of the 1st and 2nd segments very deeply impressed, making the segments very convex, in this respect much resembling *minutissimus*. Puncturation fine and even on the 1st and 2nd, more confused and irregular on the rest of the segments, there is a slight trace of a white pubescent basal band on the 2nd.

♀ sub-elongate and very like *minutissimus* in general shape, entirely black, sparingly clothed with white hairs, face rather elongate, more or less approaching the form of *punctatissimus*, etc., face dull very closely punctured, vertex shining and less closely so, clypeus largely punctured, but scarcely shining, mesonotum shining, with a distinct and well-defined puncturation on a finely rugulose surface, a well-marked central impression in front, propodeum, etc., as in the ♂, legs clothed with long white hairs, abdomen with the apices of the segments paler, basal segment very shining, finely and remotely punctured, the rest duller and closely so, 2nd segment with a very slight indication of a lateral white pubescent spot at the base.

Long. 4-4½ m.m.

Closely allied to *minutissimus*, but with a longer face, more shining and rather less closely punctured mesonotum, the central impression of which is shorter and less deep, and with the basal segment of the abdomen punctured; the propodeum also is narrower and its sides more convergent.

I have named this species in honour of Mr. W. Holland, who has done so much excellent work on the British insect fauna, and especially the Coleoptera.

Road from Pollensa to Port: *July 8.*—2 ♂ E. B. P.

Little Albufera: *July 9.*—4 ♀ E. B. P., 2 ♂ W. H.

HALICTUS MUCOREUS, Ev.

MALES.

Castle Bellver, 250–400 ft.: *June 26.*—1 ♂ W. H.

Near Porto Pi: *June 27.*—1 ♂ E. B. P., 2 ♂ W. H.

July 10.—4 ♂ E. B. P., 3 ♂ W. H., 7 ♂ A. H.

July 11.—1 ♂ E. B. P. *July 12.*—2 ♂ W. H.

FEMALES.

Castle Bellver, 250–400 ft.: *June 26.*—1 ♀ E. B. P.,
2 ♀ W. H. *July 11.*—2 ♀ A. H.

Near Porto Pi: *June 27.*—5 ♀ E. B. P., 5 ♀ W. H.,
9 ♀ A. H. *July 10.*—3 ♀ E. B. P., 6 ♀ W. H.,
3 ♀ A. H. *July 12.*—2 ♀ E. B. P., 4 ♀ W. H.,
9 ♀ A. H.

Near Palma, Lluchmayor Road: *June 28.*—1 ♀
A. H.

Plain of Palma, Road to Soller: *June 29.*—1 ♀
E. B. P.

Above Soller Pass: *July 3.*—1 ♀ W. H.

HALICTUS PULVEREUS, Mor.

Near Porto Pi: *July 10.*—1 ♂ A. H. *July 11.*—
1 ♂ W. H. *July 12.*—1 ♀ A. H.

Castle Bellver, 250–400 ft.: *July 11.*—2 ♂ E. B. P.,
5 ♂, 1 ♀ A. H.

HALICTUS GEMMEUS, Dours.

9 ♂, 170 ♀. Fairly common everywhere.

HALICTUS HAMMI, sp. nov.

Aeneo-viridis, nitidus, segmentorum abdominis apicibus testaceis
Maris caput maximum clypei apice, tibiarum basi et apice tarsisque
totis flavis, propodei area subtriangulari longitudinaliter rugosa.

Bronzy-green, sparingly clothed with white hairs, legs and antennæ black, apical margin of the abdominal segments widely pale in the ♀ narrowly in the ♂, in which latter sex a spot at the apex of the clypeus, the base and apex of the tibiæ and all the tarsi, except their apical joints, are pale yellowish white.

♂ head very large, wider considerably than the thorax, dull, and very finely and closely punctured, face across the eyes longer than wide, cheeks somewhat angularly produced above the base of the mandibles, clypeus and centre of face below the antennæ shining and more largely punctured, with a yellow spot at the apex, the colour extending a little backwards in a central line. Eyes scarcely converging, antennæ black, the joints slightly swollen beneath, those of the flagellum beyond the 3rd, about once and a quarter as long as wide; mesonotum shining, closely punctured but much less so than the head, tegulæ pale, wings hyaline with brown nervures, the stigma paler, propodeum with a well-defined subtriangular basal area, which is irregularly and longitudinally rugose, sides of the propodeum rugosely punctured; abdomen very shining, not very closely punctured, the 2nd and 3rd segments with a basal patch of white pubescence on each side, the 1st and 2nd rather deeply impressed at the apex laterally, apices of the segments beneath simple, widely pale, the 6th, at any rate as much as is visible in this specimen, testaceous, legs clothed with short white hairs.

♀ in sculpture resembling the ♂, eyes more convergent, pale bands at the apices of the segments very broad, the apical rima and sides of the 5th segment also pale, 2nd and 3rd segments with lateral white pubescent spots at the base as in the ♂, 4th with a continuous band, tibiæ narrowly paler at the base and apex, 2nd segment beneath with very long pale hairs.

Long. 5.6 m.m.

Allied to *Smcathmanellus* but differing in the pale tarsi, etc., of the ♂ and the puncturation and pale apical margins of the segments in the ♀. It is also closely allied to *simulans*, Perez, but the propodeal area is striate or vaguely so, and the apices of the abdominal segments are not punctate as they are said to be in that species.

This species is named in honour of Mr. A. H. Hamm, who has done so much in collecting and observing the British Aculeate Hymenoptera.

Soller Pass, zigzags to Soller: July 4.—1 ♂, 1 ♀
A. H.

Soller to Port: July 4.—1 ♀ A. H.

Soller to Lluch : *July* 5.—1 ♀ W. H.

Pollensa to Castillo del Rey : *July* 7.—1 ♀ E. B. P.

HALICTUS SPHECODIMORPHUS, Vach.

Soller Pass : *June* 30.—1 ♀ W. H.

NOMIOIDES PULCHELLA, Schk.

Near Porto Pi : *June* 27.—1 ♂ W. H., 5 ♂ A. H.

July 10.—4 ♂ E. B. P., 9 ♂, 1 ♀ A. H. *July*

12.—1 ♀ E. B. P., 5 ♂, 6 ♀ A. H.

Castle Bellver, 250–400 ft. : *July* 11.—10 ♂, 1 ♀ A. H.

NOMIOIDES VARIEGATA, Oliv.

Near Porto Pi : *July* 10.—1 ♀ E. B. P., 1 ♀ A. H.

July 12.—6 ♀ A. H.

ANDRENA MORIO, Brullé.

Bellver Castle, 250–400 ft. : *June* 26.—1 ♀ W. H.

Near Porto Pi : *June* 27.—1 ♀ E. B. P.

Near Palma, Lluchmayor Road : *June* 28.—1 ♀ E. B. P., 1 ♂ A. H.

Soller Pass : *June* 30.—1 ♀ E. B. P. *July* 2.—1 ♀ A. H.

Soller Pass, upper half of S. zigzags : *July* 1.—1 ♂ W. H.

ANDRENA BOYERELLA, Dours. (?).

Above Soller Pass : *July* 3.—1 ♀ W. H.

Soller to Lluch : *July* 5.—2 ♀ W. H.

ANDRENA FULVICRUS, Kirb.

Castle Bellver, 250–400 ft. : *June* 26.—2 ♀ A. H.

Near Palma, Lluchmayor Road : *June* 28.—2 ♂ E. B. P.

Above Soller Pass : *July* 3.—1 ♀ A. H.

ANDRENA, sp. (?). Allied to *minutula*.

Pollensa to Castillo del Rey : *July* 7.—2 ♂ A. H.

ANDRENA ALBOFASCIATA, Thoms. (?).

Near Porto Pi : *June* 27.—1 ♀ E. B. P.

Near Palma, Lluchmayor Road : *June* 28.—1 ♂, 1 ♀ E. B. P., 3 ♀ A. H.

- Soller Pass: *June* 29.—1 ♀ W. H., 4 ♀ A. H.
June 30.—5 ♀ E. B. P., 1 ♂ W. H., 1 ♀
 A. H. *July* 2.—1 ♀ W. H., 1 ♂, 5 ♀ A. H.
July 4.—5 ♂, 12 ♀ E. B. P.
- Soller Pass, upper half of *S. zigzags*: *July* 1.—2 ♀
 E. B. P., 8 ♀ W. H., 2 ♂, 5 ♀ A. H.
- Above Soller Pass: *July* 2.—2 ♀ E. B. P. *July*
 3.—1 ♀ E. B. P., 4 ♀ A. H.
- Soller to Port: *July* 4.—1 ♂ A. H.
- Soller to Lluch: *July* 5.—1 ♀ A. H.
- Lluch: *July* 6.—1 ♀ E. B. P.
- Road from Lluch to Pollensa: *July* 6.—1 ♂ A. H.
- Pollensa to Castillo del Rey: *July* 7.—3 ♂, 1 ♀
 E. B. P.

These are all, I believe, referable to what Schmiedeknecht describes as Thomson's species, and he mentions the Balearic Isles as a locality from which he has received it; probably it may be only a white-haired form of *Afzeliella*.

NOMIA RUFICORNIS, Luc.

- Castle Bellver, 250-400 ft.: *June* 26.—1 ♂, 1 ♀
 W. H. *July* 11.—1 ♀ A. H.
- Near Palma, Lluchmayor Road: *June* 28.—1 ♂
 E. B. P.
- Road from Luch to Pollensa: *July* 6.—1 ♂ A. H.
- Near Porto Pi: *July* 12.—1 ♂ W. H.

NOMADA MEPHISTO, Sch., ♀.

- Near Palma, Lluchmayor Road: *June* 28.—1 ♀
 A. H.

A fine, rare species.

PASITES MACULATUS, Jur.

- Near Porto Pi: *June* 27.—1 ♀ A. H. *July* 12.—
 1 ♂ A. H.

CERATINA CUCURBITINA, Rossi.

Common. (All females.)

CERATINA PARVULA, Sm.

- Road from Lluch to Pollensa: *July* 6.—1 ♀ A. H.

This is, I believe, the first record of this little species from the Balearic Isles. It was originally described from Albania.

CERATINA DALLATORREANA, Friese.

ALL FEMALES.

- Near Porto Pi: *June* 27.—2 ♀ A. H. *July* 12.—
1 ♀ E. B. P., 1 ♀ A. H.
Near Palma, Lluchmayor Road: *June* 28.—1 ♀
E. B. P.
Lluch: *July* 6.—1 ♀ W. H., 1 ♀ A. H.
Road from Lluch to Pollensa: *July* 6.—2 ♀ W. H.,
3 ♀ A. H.
Pollensa to Castillo del Rey: *July* 7.—1 ♀ E. B. P.
Road from Pollensa to Port: *July* 8.—1 ♀ E. B. P.,
5 ♀ W. H., 4 ♀ A. H. *July* 9.—2 ♀ E. B. P.

XYLOCOPA VIOLACEA, L.

- Castle Bellver, 250–400 ft.: *June* 26.—1 ♀ W. H.
Soller Pass, upper half of S. zigzags: *July* 1.—1 ♀
E. B. P.
Above Soller Pass: *July* 2.—1 ♂, 6 ♀ E. B. P.
July 3.—1 ♀ E. B. P.
Soller Pass: *July* 4.—1 ♀ E. B. P.
Soller to Lluch: *July* 5.—3 ♀ W. H., 1 ♀ A. H.
Lluch: *July* 6.—3 ♀ E. B. P., 2 ♀ W. H.
Road from Lluch to Pollensa: *July* 6.—1 ♀
E. B. P., 1 ♀ W. H.
Pollensa to Castillo del Rey: *July* 7.—4 ♀ W. H.
Little Albufera: *July* 9.—4 ♀ E. B. P.
Near Porto Pi: *July* 10.—1 ♀ A. H.

CÆLIOXYS AFRA, Lep.

- Near Porto Pi: *June* 27.—1 ♀ A. H. *July* 12.—
1 ♀ W. H.
Above Soller Pass: *July* 2.—1 ♂ E. B. P.
Soller to Port: *July* 4.—1 ♀ E. B. P.
Lluch: *July* 6.—1 ♂ W. H.
Pollensa to Castillo del Rey: *July* 7.—3 ♂ E. B. P.,
1 ♂, 1 ♀ A. H.
Road from Pollensa to Port: *July* 8.—1 ♂ W. H.
July 9.—1 ♂ W. H.
Castle Bellver, 250–400 ft.: *July* 11.—1 ♂ A. H.

CÆLIOXYS ACUMINATA, Nyl.

- Pollensa to Castillo del Rey: *July* 7.—1 ♀ E. B. P.
Apical ventral valve with an unusually blunt apex.

CHALICODOMA SICULA, Rossi.

Road from Lluch to Pollensa : *July 6.*—3 ♀ W. H.
 Pollensa to Castillo del Rey : *July 7.*—3 ♀ E. B. P.,
 1 ♀ W. H.

[All specimens much worn. Both males and females of this species were very abundant and in beautiful condition at the end of March and beginning of April in 1900 (E. M. M., Sept. 1901, p. 210). Only a few very worn females were seen three months later in 1901. E. B. P.]

MEGACHILE SERICANS, Fonsc.

Near Porto Pi. Extremely abundant July 10–12, although also seen earlier.
 Near Palma, Lluchmayor Road : *June 28.*—2 ♀ E. B. P., 2 ♀ A. H.
 Soller Pass : *June 30.*—1 ♂ E. B. P. Above Soller Pass : *July 3.*—1 ♀ W. H.
 Soller to Lluch : *July 5.*—1 ♂ E. B. P.
 Lluch : *July 6.*—1 ♀ W. H.
 Pollensa to Castillo del Rey : *July 7.*—3 ♂ E. B. P., 3 ♂, 1 ♀ W. H., 4 ♂ A. H.
 Castle Bellver, 250–400 ft. : *July 11.*—1 ♂ E. B. P., 1 ♂ W. H.

[The female when she first alights on a flower raises and shakes her abdomen, exposing the red scopa and rendering it remarkably conspicuous. She stings very freely, and the display is probably aposematic. E. B. P.]

MEGACHILE CENTUNCULARIS, L.

Soller Pass : *June 29.*—1 ♀ A. H.
 Little Albufera : *July 9.*—1 ♂ E. B. P.

MEGACHILE ARGENTATA, Ltr.

Common.

MEGACHILE ROTUNDATA, F.

Near Porto Pi : *June 27.*—1 ♀ E. B. P.
 Road from Pollensa to Port : *July 9.*—1 ♀ W. H.

MEGACHILE APICALIS, Spin.

Frequent.

ANTHIDIUM MANICATUM, Ltr.

Castle Bellver, 250–400 ft. : *June 26.*—1 ♀ E. B. P., 3 ♂, 3 ♀ W. H., 1 ♂, 2 ♀ A. H. *July 11.*—2 ♂, 4 ♀ E. B. P.

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Near Porto Pi : *June* 27.—1 ♂, 1 ♀ W. H., 2 ♂
A. H. *July* 11.—1 ♀ W. H.

Near Palma, Lluchmayor Road : *June* 28.—1 ♂,
1 ♀ E. B. P., 5 ♂, 4 ♀ A. H.

Lluch : *July* 6.—2 ♂, 2 ♀ W. H., 1 ♀ A. H.

ANTHIDIUM CINGULATUM, Ltr.

Common.

ANTHIDIUM FLORENTINUM, F.

Castle Bellver, 250–400 ft. : *June* 26.—2 ♂, 4 ♀
W. H.

ANTHIDIUM 7-DENTATUM, Ltr.

Castle Bellver, 250–400 ft. : *June* 26.—1 ♀ E. B. P.

Soller Pass : *June* 29.—1 ♀ A. H. *June* 30.—1 ♀
W. H. *July* 2.—1 ♀ A. H.

Soller Pass, upper half of S. zigzags : *July* 1.—1 ♂
W. H., 1 ♂, 1 ♀ A. H.

Above Soller Pass : *July* 2.—1 ♂ E. B. P. *July*
3.—1 ♀ E. B. P., 1 ♀ W. H.

Soller to Lluch : *July* 5.—3 ♂ E. B. P.

Road from Lluch to Pollensa : *July* 6.—1 ♀ W. H.

Base of Monte Sentuiri : *July* 6.—1 ♂ W. H., 1 ♂
A. H.

Pollensa to Castillo del Rey : *July* 7.—1 ♀ W. H.,
1 ♀ A. H.

Near Porto Pi : *July* 11.—1 ♂ W. H.

ANTHIDIUM LITURATUM, Pz.

Road from Lluch to Pollensa : *July* 6.—1 ♀ A. H.

Pollensa to Castillo del Rey : *July* 7.—1 ♀ A. H.

ERIADES CRENULATUS, Nyl.

Castle Bellver, 250–400 ft. : *June* 26.—1 ♀ A. H.

Near Porto Pi : *June* 27.—1 ♂ W. H.

Near Palma, Lluchmayor Road : *June* 28.—1 ♂
E. B. P., 3 ♀ A. H.

Lluch : *July* 6.—1 ♀ E. B. P., 1 ♀ W. H.

Road from Lluch to Pollensa : *July* 6.—1 ♀
E. B. P., 1 ♀ W. H., 1 ♂, 3 ♀ A. H.

Pollensa to Castillo del Rey : *July* 7.—2 ♂, 1 ♀
E. B. P., 2 ♂, 1 ♀ A. H.

ERIADES RUBICOLUS, Per.

Near Palma, Lluchmayor Road: *June* 28.—2 ♂,
5 ♀ E. B. P., 3 ♀ A. H.

Plain of Palma, road to Soller: *June* 29.—1 ♀
A. H.

Lluch: *July* 6.—2 ♀ W. H., 1 ♂, 2 ♀ A. H.

Road from Lluch to Pollensa: *July* 6.—2 ♀ A. H.

Base of Monte Sentuiri: *July* 6.—1 ♀ A. H.

Pollensa to Castillo del Rey: *July* 7.—2 ♂ A. H.

Road from Pollensa to Port: *July* 9.—1 ♀ A. H.

Near Porto Pi: *July* 10.—1 ♂ A. H.

OSMIA NOTATA, F.

Near Porto Pi: *June* 27.—1 ♀ A. H.

Near Palma, Lluchmayor Road: *June* 28.—6 ♀
A. H.

Soller Pass, upper half of S. zigzags: *July* 1.—2 ♀
E. B. P., 1 ♀ W. H.

Soller Pass: *July* 2.—1 ♀ A. H.

Above Soller Pass: *July* 3.—1 ♀ A. H.

Soller to Lluch: *July* 5.—4 ♀ E. B. P., 6 ♀ A. H.

OSMIA CERULESCENS, L.

Near Palma, Lluchmayor Road: *June* 28.—1 ♀
A. H.

Road from Lluch to Pollensa: *July* 6.—1 ♀ A. H.

Pollensa to Castillo del Rey: *July* 7.—2 ♀ W. H.

OSMIA AURULENTA, Pz.

Above Soller Pass: *July* 3.—1 ♀ (worn) W. H.

OSMIA ADUNCA, Ltr.

Castle Bellver, 250–400 ft.: *June* 26.—4 ♀ E. B. P.

Near Palma, Lluchmayor Road: *June* 28.—6 ♀
E. B. P., 8 ♀ A. H.

Lluch: *July* 6.—1 ♀ W. H., 2 ♀ A. H.

Road from Lluch to Pollensa: *July* 6.—1 ♂
E. B. P., 4 ♀ W. H.

Pollensa to Castillo del Rey: *July* 7.—2 ♀ E. B. P.,
2 ♀ W. H.

OSMIA TRIDENTATA, Duf. Perr.

Road from Lluch to Pollensa: *July* 6.—1 ♀ (worn),
W. H.

CROCISA RAMOSA, Lep.

- Castle Bellver, 250-400 ft.: *June* 26.—1 ♀ E. B. P.
Near Porto Pi: *June* 27.—1 ♂ W. H. *July* 10.—
1 ♂ A. H. *July* 12.—1 ♂ E. B. P.
Near Palma, Lluchmayor Road: *June* 28.—1 ♀
A. H.
Soller Pass, upper half of S. zigzags: *July* 1.—3 ♂
W. H.
Above Soller Pass: *July* 2.—1 ♂ E. B. P.
Soller to Port: *July* 4.—1 ♂ E. B. P., 1 ♂ A. H.
Soller to Lluch: *July* 5.—2 ♂ E. B. P.
Lluch: *July* 6.—1 ♀ W. H., 1 ♂, 1 ♀ A. H.
Road from Lluch to Pollensa: *July* 6.—6 ♂ E. B. P.,
2 ♂, 2 ♀ W. H., 2 ♂ A. H.
Pollensa to Castillo del Rey: *July* 7.—5 ♂ E. B. P.,
2 ♀ W. H., 5 ♂, 2 ♀ A. H.
Road from Pollensa to Port: *July* 8.—1 ♂ E. B. P.,
3 ♂ W. H. *July* 9.—2 ♀ E. B. P.
Little Albufera: *July* 8.—3 ♂ A. H.

PODALIRIUS ALBIGENUS, Lep.

- Castle Bellver, 250-400 ft.: *June* 26.—2 ♀ W. H.,
2 ♀ A. H.
Near Porto Pi: *June* 27.—2 ♀ E. B. P., 3 ♀ A. H.
Near Palma, Lluchmayor Road: *June* 28.—4 ♂,
2 ♀ E. B. P., 2 ♂, 1 ♀ A. H.
Soller to Port: *July* 4.—1 ♂ E. B. P.

PODALIRIUS 4-FASCIATUS, Vill.

Common.

EUCERA GRISEA, F.

- Near Porto Pi: *June* 27.—2 ♀ E. B. P., 1 ♀ A. H.
Near Palma, Lluchmayor Road: *June* 28.—1 ♀
A. H.

[The remarks on *Chalicodoma sicula* (p. 620) apply to this species, of which the examples were also in an extremely worn condition. E. B. P.]

BOMBUS TERRESTRIS, L., var. *ferrugineus*, Schmied.

- Castle Bellver: *June* 26.—4 ♀ W. H.
Near Porto Pi: *June* 27.—1 ♀ E. B. P.

Soller Pass: *June* 29.—1 ♂, 1 ♀ E. B. P., 1 ♂, 2 ♀ A. H. *June* 30.—1 ♂ A. H. Below S. zigzags: *July* 1.—1 ♂, 1 ♀ W. H. *July* 2.—1 ♀ A. H. Above Pass: *July* 2.—1 ♀, 1 ♀ E. B. P. *July* 3.—1 ♀ E. B. P., 2 ♀ W. H.
 Soller to Port: *July* 4.—1 ♀, 1 ♀ E. B. P.
 Little Albufera: *July* 9.—1 ♀ A. H.

[Many more were seen and not taken, especially on Soller Pass. E. B. P.]

APIS MELLIFICA, L.

Everywhere.

II. SPAIN (1901-2).

Introduction by E. B. POULTON, F.R.S.

A FEW specimens of four species of ants taken by the present writer near Barcelona in 1900 are included in this section, as well as the captures on July 17, 1901, at Cerbère, the French frontier station at the east end of the Pyrenees.

The number of specimens submitted to Mr. Saunders was much smaller than in the case of Majorca, being 1491 in the first instance, together with 187 which were looked upon as duplicates. The numbers from the various localities are as follows (see Table, p. 625)—

The number of specimens is thus considerably less than half those captured in Majorca (June 26 to July 12, 1901). On the other hand, the number of species from the mainland recognized by Mr. Saunders is far greater, being 205 as compared with 143. This marked difference is no doubt in part due to the wider range covered both in space and time on the mainland; but making all allowances it is probably chiefly the result of the more limited number of species in the island fauna. The relative peculiarity of the latter is also well seen in the fact that five of its species are described as new, and of these one only occurs in the mainland list, viz. *Halictus dubitabilis*. No other new species is described from the mainland, although both lists contain forms which may be new, but

Cerbère, July 17, 1901	179 specimens.
Port Bou, June 24, 1901	179 ,,
Barcelona, June 25 } ,, July 13 } 1901 ,, July 16 }	310 ,,
Montserrat (including Monistrol), July 13-16, } 1901 }	493 ,,
Duplicates chiefly from Port Bou and Bar- } celona, 1901 }	187 ,,
Sierra de Guadarrama, La Granja (July) 20-26), and El Escorial (July 28),) including a few from Segovia (July) 1902 27), Madrid (July 17), and Burgos) (July 30) }	330 ,,
Total	1678 ,,

either obscure or represented by insufficient material. Only 73 species, or as nearly as possible half of the Majorcan species, are common to the two lists, so that altogether 275 species are distinguished in this memoir.

It would be rash to build much on a comparison of the lists of Aculeates obtained in such short visits, lists which are obviously very incomplete. Nevertheless, they probably contain the majority of the commonest species to be found at the times when the collections were made. A brief tabular statement (see p. 626) will show at a glance the groups which in our limited experience were found to be strongly or feebly developed in the island fauna as compared with the mainland.

A brief account of the chief characteristics of the localities on the mainland is given below. The order followed is that of the dates, beginning with the earliest.

1900.

In the wet and cold spring of 1900 I stayed at Barcelona for two or three days before visiting Majorca. On March 20 a little collecting was attempted at Vallvidrera, on the ridge of the hills behind the city. It was rather warmer

	No. of species in Majorcan list.	No. of species in mainland list.	Species common to both.
<i>Ants</i> . . .	11	16	7
<i>Scolia</i> . . .	2	7	2
<i>Pompilus</i> . . .	16	8	2
<i>Salix</i> . . .	4	0	0
<i>Ammophila</i> . . . (and <i>Psammophila</i>)	2	5	2
<i>Sphex</i> . . .	3	5	2
<i>Bembex</i> . . .	1	4	1
<i>Cerceris</i> . . .	4	8	4
<i>Oxybelus</i> . . .	1	4	1
<i>Crabro</i> . . .	4	2	1
<i>Odynerus</i> . . .	5	8	4
<i>Prosopis</i> . . .	6	10	5
<i>Colletes</i> . . .	0	6	0
<i>Sphcodes</i> . . .	3	6	2
<i>Halictus</i> . . .	13	25 (including <i>H. dubitabilis</i> , n. sp.)	7
<i>Andrena</i> . . .	5	5	2
<i>Ceratina</i> . . .	3	7	2
<i>Megachile</i> . . .	5	11	4
<i>Anthidium</i> . . .	5	8	4
<i>Osmia</i> . . .	5	7	3
<i>Podalirius</i> . . .	2	9	2
<i>Psithyrus</i> . . .	0	1	0
<i>Bombus</i> . . .	1	5	1

than usual on that day, and *Eristalis* was seen upon the wing, but nearly the whole of the few captures were made

by turning over stones. The only Hymenoptera were ants belonging to four species. A visit to Montserrat, the locality which we found so rich in July 1901, yielded very few insects, and no Hymenoptera at all.

1901.

June 24.—Mr. W. Holland, Mr. A. H. Hamm, and I arrived at Port Bou, the Spanish frontier station in the Eastern Pyrenees, late at night on June 23. The next boat for Majorca did not leave until the evening of the 25th, so it was decided to spend the whole of the 24th collecting at Port Bou, instead of going on to Barcelona. First the bare hot slopes near the station were explored, and many insects captured; then, following a hint given by the proprietor of the hotel, we penetrated a valley running up into the hills behind the little port. At the bottom of the valley there was a stream with abundant and varied plants; but the slopes also were still green and afforded a rich collecting ground. Lepidoptera were by no means common, but of insects generally we saw far more than on any other occasion throughout the journey. It is a locality which would probably well repay a more extended visit.

June 25.—The train for Barcelona started early in the morning, so that no insects could be collected at Port Bou on this day. Barcelona was reached a few hours before the boat sailed, and a considerable number of insects were taken in waste ground upon which wild flowers were growing.

July 13.—We landed at Barcelona in the morning, and spent some hours collecting in waste ground. In the early afternoon we took the train for Montserrat. A few insects were caught at Monistrol (2200 ft.) while waiting for the cars of the funicular railway. The terminus on Montserrat was reached early in the evening in time for a little collecting. At the height of the terminus and Hospederia (about 3000 ft.) the vegetation was fresh and green, and the collecting most interesting, varied, and tolerably rich. The bramble blossoms were at their best and very attractive.

July 14.—The whole day was spent at about the height of the Hospederia and not far from it. The level mountain path which begins opposite the Hospederia was

explored for a considerable distance, and many productive spots were searched.

July 15.—This day was occupied in a walk to San Geronimo and the summit of the mountain (4000 ft.). Good collecting was found in a great variety of conditions—an alternation of bare rocky slopes, shady woods, and sunny valleys. Just below the summit rich collecting was found in the fine, open, grassy valley, at the head of which is the hermitage of San Geronimo.

July 16.—The collecting on this day was an exact repetition of that upon July 13, taken of course in the reverse order—at Montserrat, in the neighbourhood of the Hospederia, before starting; at Monistrol waiting for the main-line train; and at Barcelona in waste ground.

July 17.—We arrived at Cerbère, the French frontier station, at night, and collected for several hours next morning (17th). The vegetation was far more parched than at Port Bou three weeks before; but apart from this the hills were not so accessible, and the country in the neighbourhood of the station much cultivated and less favourable as a collecting ground. Nevertheless, we captured a large number of insects of several orders, conveying a fair idea of some dominant elements in the insect fauna about the middle of July.

Thus a successful expedition was brought to a successful close. The weather on the mainland was perfect, every day bringing cloudless skies and bright sun.

1902.

To pass from the cold, sunless summer of 1902 in England to the glaring light and heat of Madrid was a contrast too sharp for human nature to bear with equanimity; so, after capturing a few insects in the Park on July 17, I took the advice of my kind friends Señor Don Ignacio Bolivar and Mr. G. C. Champion and started for La Granja (San Ildefonso) in the Sierra Guadarrama. This little town, with an altitude of about 4000 ft., possesses, at any rate in the month of July, the most delightful atmosphere and climate. During the whole visit there was neither rain nor cloud to interfere with the pursuit of natural history. At a rather higher elevation than the town the extensive Palace grounds contain abundant streams and woods, intersected by broad, sunny drives. The trees are rather small, permitting the pene-

tration of plenty of light, and thus favouring a luxuriant and varied undergrowth. Outside the town in another direction is open heath-clad country, traversed by streams bordered with thickets and small trees. Behind La Granja rises the fine mountain of La Peñalara with an altitude of 7976 ft. The first part of the ascent is made through pine woods and upland lawns, the last part over bare slopes with a scanty vegetation. Some hundreds of feet below the summit a few masses of snow still resist the heat of July, aided by the shade of a ravine and the artificial protection of litter.

It will be realized from the above description that La Granja is a remarkably favourable locality for the naturalist. I have never seen so much insect life or such evidence of injury from the attacks of enemies. Corresponding with these indications—the symmetrically torn and notched wings of freshly-emerged butterflies—I noticed that the birds were abundant and of many species. The numbers of birds and the prevalence of injured specimens were both especially characteristic of the Palace grounds.

The specimens from La Granja were taken at a height of about 4000 ft. The elevation of the Palace is given at 3907 ft., and the grounds rise with the slope of the Sierra to a considerably higher level. The captures outside the town were made, in some cases, at a rather lower level, in others as high or higher than the Palace. An approximate elevation of "about 4000 ft." is recorded for the insects taken upon all dates except August 25, when an excursion was made to near the summit of Peñalara. Captures were made at all the levels, including the top of a castellated mass of rock at a probable height of about 7700 ft. Insects were collected during the visit to La Granja from the 20th to the 26th of July, both dates inclusive.

In concluding a brief account of this visit to La Granja, I desire to express my obligations to Monsieur Chretien for his great kindness in inviting me to reap the fruits of his much longer and more intimate experience of this delightful locality.

July 27.—An early start was made for Segovia, where several hours were spent. A little collecting was done on the outskirts, and a considerable amount in a paved courtyard outside the cathedral. The wild flowers growing at the boundaries of the enclosure, and between the paving-

stones, as well as on a piece of waste ground at one side, attracted many insects, of which a fairly representative collection was made. The elevation is given at 3280 ft.

July 28.—El Escorial. In the morning ants were collected in one of the main streets, and in the afternoon a number of insects were captured by a little stream just above the town, and on the slope of the Sierra. Insects were abundant and varied, and considering the short space of time which was available, a fair number of species were taken. The altitude was about 2900 to 3000 ft. Although rich in insect life the Sierra Guadarrama at El Escorial is not nearly so varied or so attractive as at La Granja. The great expanse of open mountain side was well clothed with plants of many species, but the woods and groves and abundant streams were wanting.

July 30.—On the return journey one or two insects were taken at Burgos (about 3000 ft.).

In conclusion I desire to thank Colonel Yerbury for his kindness in naming the *Asilidæ* which were found attacking the Aculeates.

E. B. POULTON.

All captures in the years 1900 and 1902 were made by E. B. Poulton, and no initials are affixed to these specimens. The captors in 1901 are indicated as in the Majorcan list, by their initials, E. B. P., W. H., and A. H.

CAMPONOTUS MACULATUS, F.

1900. Barcelona, Vallvidrera, under stone: *Mar.* 20.—
4 ♀.
1901. Port Bou: *June* 24.—1 ♀ W. H.
Montserrat, near Terminus: *July* 14.—1 ♂, 14
♀ E. B. P.
Monistrol: *July* 16.—1 ♂ E. B. P.

CAMPONOTUS MACULATUS, race COGNATUS.

1901. Port Bou: *June* 24.—1 ♀ E. B. P.

CAMPONOTUS CRUENTATUS, Ltr.

1900. Barcelona, Vallvidrera, under stone: *Mar.* 20.
—4 ♀.
1901. Montserrat, near Terminus: *July* 13.—1 ♀
E. B. P. *July* 14.—7 ♀ E. B. P., 16 ♀ A. H.

1902. La Granja, Palace Grounds: *July 22.*—1 ♂.
El Escorial: *July 28.*—2 ♂, 4 ♀, 8 ♀ (one
being devoured by *Dasygogon diadema* ♀,
the other by *Machimus chrysitis* ♀).

CAMPONOTUS FORELI, Emery.

1901. Monistrol: *July 16.*—1 ♀ E. B. P.
1902. La Granja, Peñalara (about 7000 ft.): *July*
25.—12 ♀ on small composite flower.

CAMPONOTUS LATERALIS, Oliv.

1901. Port Bou: *June 24.*—4 ♀ W. H.
Montserrat, near Terminus: *July 14.*—6 ♀
E. B. P. Hospederia to San Geronimo
(3000–4000 ft.): *July 15.*—3 ♀ E. B. P.
Near summit, San Geronimo (about 4000
ft.): *July 15.*—2 ♀ E. B. P.

MYRMECOCYSTUS ALBICANS, Roger (?).

1902. La Granja: *July 24.*—1 ♂. La Granja,
Peñalara, near top (about 7700 ft.): *July*
25.—1 ♀ (being devoured by *Dysmachus*
trigonus ♂).

FORMICA RUFa, L.

1902. La Granja, Palace Grounds: *July 22.*—2 ♀.
July 24.—1 ♀ of race *pratensis* (being
devoured by *Dasygogon diadema* ♀). La
Granja, path to Peñalara (about 5500 ft.):
July 25.—1 ♀.

FORMICA FUSCA, L.

1901. Port Bou: *June 24.*—3 ♀ W. H.
Montserrat, near Terminus: *July 14.*—1 ♀
E. B. P.

FORMICA FUSCA, race CUNICULARIA.

1901. Port Bou: *June 24.*—2 ♀ A. H.

FORMICA FUSCA, race CINEREO RUFIBARBIS.

1901. Barcelona: *June 25.*—2 ♀ A. H. *July 13.*—
1 ♀ A. H.
1902. La Granja: *July 20.*—11 ♀.

LASIUS NIGER, L.

1902. Madrid: *July* 17.—1 ♂, 4 ♀.
 La Granja: *July* 23.—6 ♀.
 Segovia (3280 ft.): *July* 27.—3 ♀.
 El Escorial: *July* 28.—51 ♂, 13 ♀, 9 ♀, one pair *in copulâ*.

LASIUS NIGER, race EMARGINATUS (?).

1901. Port Bou: *June* 24.—7 ♀ A. H.

TAPINOMA ERRATICUM, Ltr.

1902. La Granja: *July* 23.—1 ♀.

TETRAMORIUM CÆSPITUM, L.

1900. Barcelona, Vallvidrera: *Mar.* 20.—1 ♀.
 1902. La Granja, Palace Grounds: *July* 20.—1 ♂.
 El Escorial: *July* 28.—1 ♀.

APHÆNOGASTER BARBARA, L.

1900. Barcelona, Vallvidrera, under stone: *Mar.* 20.
 —1 ♀.
 1901. Port Bou: *June* 24.—14 ♀ W. H., 70 ♀ (major and minor) A. H.
 1902. Segovia: *July* 27.—17 ♀.

APHÆNOGASTER STRUCTOR, Ltr.

1902. Madrid: *July* 17.—6 ♀.

APHÆNOGASTER TESTACEOPILOSA, Luc.

1901. Barcelona: *July* 13.—1 ♀ E. B. P.

APHÆNOGASTER STRIOLA, Roger.

1901. Montserrat, near Railway Terminus: *July* 14.
 —1 ♀ A. H.
 Montserrat, Hospederia to San Geronimo (3000–4000 ft.): *July* 15.—1 ♀ E. B. P., 1 ♀ A. H.
 Ditto (about 4000 ft.): 1 ♀ A. H.

PHEIDOLE MEGACEPHALA, F.

1901. Port Bou: *June* 24.—1 ♀ W. H., 10 ♀ A. H.
 Montserrat, near Railway Terminus: *July* 13.
 —3 ♀ E. B. P., 1 ♀ W. H., 1 ♂, 15 ♀ A. H.
 (all winged forms). *July* 15.—1 pair *in copulâ*, E. B. P., 3 ♀ A. H.

Montserrat, Hospederia to San Geronimo
(3000-4000 ft.): *July 15.*—1 ♂, 1 ♀ E. B. P.,
1 ♀ W. H., 4 ♀ A. H.

Near summit, San Geronimo (about 4000 ft.):
July 15.—1 ♀ A. H.

CREMASTOGASTER SCUTELLARIS, Oliv. var.

1901. Montserrat, near Railway Terminus: *July 14.*
—15 ♀ E. B. P.

MYZINE 3-PUNCTATA, Rossi.

1901. Port Bou: *June 24.*—1 ♂ E. B. P., 2 ♂ A. H.

MYZINE 3-PUNCTATA, var. *nigrifrons*, Sm.

1901. Cerbère: *July 17.*—4 ♂ E. B. P., 5 ♂ W. H.
4 ♂ A. H.

TIPHIA FEMORATA, F.

1902. La Granja: *July 23.*—2 ♂ (one being de-
voured by *Dasygogon diadema* ♀).

SCOLIA FLAVIFRONS, F.

1901. Port Bou: *June 24.*—1 ♀ W. H.
Barcelona: *June 25.*—7 ♂ E. B. P., 1 ♂ A. H.

SCOLIA INTERSTINCTA, Kl.

1901. Cerbère: *July 17.*—1 ♂ A. H.
Montserrat, near Railway Terminus: *July 15.*
—1 ♂ A. H.

Montserrat, Hospederia to San Geronimo
(3000-4000 ft.): *July 15.*—1 ♂, 3 ♀ E. B. P.,
1 ♀ A. H.

SCOLIA 4-PUNCTATA, F. Common.

Captured (1901) at Cerbère, Port Bou, Barcelona,
Montserrat, and (1902) La Granja and Segovia.

SCOLIA HIRTA, Schrk.

1901. Port Bou: *June 24.*—3 ♂ A. H. (one a var.
with single abdominal band).

Montserrat, Hospederia to San Geronimo
(3000-4000 ft.): *July 15.*—1 ♀ E. B. P.

SCOLIA UNIFASCIATA, Cyril.

1902. La Granja: *July 22.*—4 ♂.

Segovia: *July 27.*—2 ♂.

El Escorial: *July 28.*—1 ♂.

SCOLIA (*Elis*) VILLOSA, F.

1901. Port Bou: *June* 24.—1 ♂ W. H.
 Cerbère: *July* 17.—10 ♂ E. B. P., 13 ♂ W. H.,
 10 ♂, 1 ♀ A. H.
1902. La Granja: *July* 24.—1 ♂.
 Segovia: *July* 27.—18 ♂, 1 ♀.
 El Escorial: *July* 28.—1 ♂.

SCOLIA (*Elis*) 6-MACULATA, F.

1902. La Granja, Peñalara, near summit (7700 ft.):
July 25.—1 ♂.

POMPILUS (*Pedinaspis*) AURIVILLIUSI, Tourn. (?).

1901. Montserrat, Hospederia to San Geronimo
 (3000–4000 ft.): *July* 15.—1 ♀ E. B. P.

POMPILUS LUCTIGERUS, Cost.

1901. Montserrat, Hospederia to San Geronimo
 (3000–4000 ft.): *July* 15.—1 ♂ W. H.

A well-marked ♂, easily recognizable by the tufts of hair on the 6th ventral segment.

POMPILUS VIATICUS, L.

1902. La Granja: *July* 20.—1 ♀ (being devoured by
Dasyopogon diadema ♀). *July* 22.—1 ♀.

[The striking mimetic resemblance borne by the Dipterous captor to its Aculeate prey led to the note on Asilid mimicry at the end of this memoir, p. 661. E. B. P.]

POMPILUS RUFIPES, L., var.

1901. Port Bou: *June* 24.—1 ♂ A. H.

POMPILUS FUSCIPENNIS, V. de L.

1902. La Granja: *July* 22 and 26.—2 ♀.
 La Granja, path to Peñalara (about 5000 ft.):
July 25.—1 ♀.

Fine examples of this very large species.

POMPILUS FUMIPENNIS, Lett., var. (?).

1902. La Granja, path to Peñalara (4000–7000 ft.):
July 25.—1 ♀.

POMPILUS INDELICTUS, Tourn. (?).

1902. La Granja, above Palace: *July* 21.—1 ♀.

POMPILUS 4-PUNCTATUS, F.

1902. La Granja, above Palace: *July* 21.—1 ♀.

PSEUDAGENIA CARBONARIA, Scop.

1902. La Granja, Palace Grounds: *July* 20.—1 ♀.

ASTATA BOOPS, Schr.

1901. Monistrol: *July* 16.—1 ♀ E. B. P.

TACHYTES EUROPÆA, Kohl.

1902. La Granja: *July* 24.—1 ♂. *July* 26.—1 ♀.

TACHYSPHEX PYGIDIALIS, Kohl.

1901. Port Bou: *June* 24.—2 ♂, 1 ♀ A. H.

Barcelona: *July* 16.—3 ♀ A. H.

TACHYSPHEX EUROPÆA, Kohl.

1901. Port Bou: *June* 24.—1 ♂ A. H.

TACHYSPHEX PANZERI, V. de L.

1901. Barcelona: *July* 16.—2 ♀ A. H.

TRYPOXYLON SCUTATUM, Chevr.

1901. Montserrat, near Railway Terminus: *July* 15.
—1 ♀ A. H.

TRYPOXYLON FIGULUS, L.

1902. La Granja: *July* 23.—1 ♀.

AMMOPHILA SABULOSA, L.

1901. Montserrat, near Railway Terminus: *July* 14.
—1 ♂ E. B. P., 1 ♂ W. H.

AMMOPHILA HEYDENI, Dhl.

1901. Cerbère: *July* 17.—1 ♂ E. B. P., 2 ♂, 1 ♀
W. H., 2 ♂, 2 ♀ A. H.

1902. El Escorial: *July* 28.—1 ♀.

AMMOPHILA IBERICA, Andr.

1902. El Escorial: *July* 28.—1 ♀.

PSAMMOPHILA TYDEI, Guil.

1901. Port Bou: *June* 24.—1 ♀ E. B. P., 1 ♀ A. H.
 Barcelona: *June* 25.—2 ♂ A. H. *July* 13.—
 1 ♀ W. H.
 Montserrat, Hospederia to San Geronimo
 (3000–4000 ft.): *July* 15.—1 ♀ W. H.

PSAMMOPHILA HIRSUTA, Scop.

1901. Montserrat (about 3000 ft.), near Railway
 Terminus: *July* 14.—4 ♂ E. B. P., 1 ♂
 W. H. *July* 15.—1 ♂ E. B. P.
 Montserrat, Hospederia to San Geronimo
 (3000–4000 ft.): *July* 15.—4 ♂ E. B. P.,
 4 ♂ W. H., 4 ♂ A. H.
1902. La Granja, Palace Grounds: *July* 20.—1 ♂.
 Above Palace: *July* 21.—1 ♂. *July* 24.
 —1 ♂.
 Peñalara, near summit (about 7500 ft.): *July*
 25.—Swarm seen and several specimens
 captured.
 El Escorial: *July* 28.—1 ♂.

[A brief account of the swarm on Peñalara, together
 with a suggestion as to its probable significance, is given
 in Proc. Ent. Soc. Lond., 1904, p. xxiv. E. B. P.]

SPHEX NUDATUS, Kohl. (?).

1902. La Granja: *July* 24.—1 ♀.

SPHEX ALBISECTUS, Lep.

1901. Port Bou: *June* 24.—1 ♂ A. H.
 Barcelona: *July* 16.—1 ♀ A. H.
 Montserrat, near Railway Terminus: *July*
 14.—1 ♀ A. H.
 Montserrat, Hospederia to San Geronimo
 (3000–4000 ft.): *July* 15.—1 ♀ A. H.

SPHEX SUBFUSCATUS, Dhl.

1901. Cerbère: *July* 17.—1 ♀ E. B. P.
 Port Bou: *June* 24.—1 ♂ E. B. P.
1902. La Granja, above Palace: *July* 20.—1 ♂.

SPHEX FLAVIPENNIS, Ltr.

1901. Port Bou: *June* 24.—1 ♂ A. H.
 Cerbère: *July* 17.—1 ♂ E. B. P.
 Montserrat, near Railway Terminus: *July* 14.
 —1 ♂ W. H., 1 ♀ A. H.

SPHEX MAXILLOSUS, L.

1901. Montserrat, Hospederia to San Geronimo
(3000-4000 ft.): *July 15.*—1 ♂ E. B. P.

SCELIPHRON FEMORATUM, F.

1901. Port Bou: *June 24.*—1 ♂ E. B. P.

SCELIPHRON PENSILIS, Ill.

1901. Cerbère: *July 17.*—1 ♂ W. H.
Port Bou: *June 24.*—1 ♀ E. B. P.
Montserrat, Hospederia to San Geronimo
(3000-4000 ft.): *July 15.*—1 ♀ W. H.
1902. La Granja, Palace Grounds: *July 20.*—1 ♂.
Ditto, above Palace: *July 21.*—1 ♀.

SCELIPHRON SPIRIFEX, L.

1901. Barcelona: *July 13.*—1 ♀ E. B. P., 1 ♀ W. H.

PEMPHREDON AUSTRIACUS, Kohl. (?)

1901. Barcelona: *July 13.*—1 ♀ W. H., 2 ♂, 2 ♀
A. H.

NYSSON SCALARIS, Duf.

1902. La Granja: *July 24.*—1 ♂. *July 26.*—1 ♂,
1 ♀.

BEMBEX INTEGRATA, Pz.

1902. La Granja: *July 20.*—1 ♀. *July 25.*—2 ♂.
July 26.—1 ♂.
Ditto, above Palace: *July 21.*—1 ♀.
Ditto, Palace Grounds: *July 22.*—1 ♀.

BEMBEX SINUATA, Ltr.

1901. Cerbère: *July 17.*—1 ♂ W. H., 1 ♂ A. H.
Barcelona: *July 13.*—1 ♀ E. B. P., 1 ♂ A. H.
July 16.—Abundant.
Montserrat, Hospederia to San Geronimo
(3000-4000 ft.): *July 15.*—1 ♂ E. B. P.

BEMBEX OCULATA, Ltr. var.

1901. Barcelona: *June 25.*—1 ♂ E. B. P.

BEMBEX MEDITERRANEA, Hdl.

1901. Barcelona: *July* 16.—1 ♀ E. B. P.

CERCERIS BUPRESTICIDA, Duf.

1902. La Granja: *July* 20.—5 ♀. *July* 23.—4 ♂.
El Escorial: *July* 28.—1 ♂.

CERCERIS 4-MACULATA, Duf.

1901. Monistrol: *July* 16.—1 ♀ E. B. P.

CERCERIS EMARGINATA, Pz.

1901. Cerbère: *July* 17.—1 ♂ E. B. P.
Port Bou: *June* 24.—1 ♂ W. H.
Barcelona: *July* 13.—1 ♂ W. H., 1 ♂ A. H.
July 16.—2 ♂ E. B. P., 1 ♂ W. H., 2 ♂,
1 ♀ A. H.
Montserrat, near Railway Terminus: *July* 14.
—2 ♂ E. B. P.
Monistrol: *July* 13.—1 ♀ E. B. P. *July*
16.—1 ♂ A. H.

Ditto, var. (?).

1902. La Granja: *July* 23.—1 ♂. *July* 24.—1 ♂.
July 26.—1 ♂.

CERCERIS RYBYENSIS, L.

1901. Montserrat, near Railway Terminus: *July* 14.
—1 ♂ E. B. P., 1 ♂ A. H.
Montserrat, Hospederia to San Geronimo
(3000-4000 ft.): *July* 15.—1 ♀ E. B. P.,
1 ♀ A. H.
Ditto, near summit (about 4000 ft.): *July* 15.
—1 ♀ A. H.

Ditto, var.

1901. Barcelona: *July* 16.—1 ♀ A. H.

CERCERIS 4-CINCTA, V. de L.

1901. Barcelona: *July* 16.—1 ♀ A. H.
Montserrat, near Railway Terminus: *July* 14.
—2 ♂ E. B. P., 1 ♂ W. H., 3 ♂, 1 ♀ A. H.
July 15.—1 ♀ E. B. P., 1 ♀ A. H.
Montserrat, Hospederia to San Geronimo
(3000-4000 ft.): *July* 15.—4 ♂ E. B. P., 1 ♂
A. H.

CERCERIS FERRERI, V. de L.

1901. Port Bou: *June 24.*—1 ♂ E. B. P.

CERCERIS LABIATA, F.

1901. Montserrat, Hospederia to San Geronimo
(3000-4000 ft.): *July 15.*—1 ♂ E. B. P.

CERCERIS ARENARIA, L.

1901. Montserrat, near Railway Terminus: *July 14.*
—3 ♂ E. B. P.

Montserrat, Hospederia to San Geronimo
(3000-4000 ft.): *July 15.*—1 ♂ W. H.

PHILANTHUS TRIANGULUM, F.

1901. Barcelona: *June 25.*—2 ♂ E. B. P., 4 ♂
A. H. *July 13.*—3 ♂ E. B. P. *July 16.*
—Abundant. Females captured as well as
males, although not in equal numbers.

OXYBELUS 14-NOTATUS, Jur.

1901. Barcelona: *July 13.*—1 ♂ W. H., 1 ♂ A. H.

OXYBELUS 3-SPINOSUS, F.

1901. Barcelona: *July 13.*—1 ♂ A. H. *July 16.*
—1 ♀ W. H.

OXYBELUS MELANCHOLICUS, Chevr.

1902. La Granja, above Palace: *July 21.*—1 ♀.

OXYBELUS LAMELLATUS, Oliv.

1901. Barcelona: *June 25.*—3 ♀ A. H.

ENTOMOGNATHUS BREVIS, V. de L.

1901. Montserrat, near Railway Terminus: *July 14.*
—1 ♂, 1 ♀ E. B. P.

CRABRO HYPSEÆ, de Stef., *punctatus*, H.-Sch. (nec Lep.?).

1901. Cerbère: *July 17:* 1 ♀ E. B. P.

CRABRO CLYPEATUS, Schreb.

1901. Cerbère: *July 17.*—1 ♀ A. H.
Barcelona: *July 16.*—1 ♀ A. H.

CELONITES ABBREVIATUS, Vill.

1901. Cerbère: *July 17.*—1 ♂ E. B. P.

VESPA GERMANICA, Fab.

1901. Barcelona: *June* 25.—1 ♀ E. B. P.
 Montserrat, Hospederia to San Geronimo
 (3000-4000 ft.): *July* 15.—1 ♀ A. H.

VESPA SYLVESTRIS, Scop.

1902. La Granja: *July* 20.—1 ♂, 1 ♀. *July* 25.—
 1 ♀. Above Palace: *July* 21.—1 ♂.

POLISTES GALLICA, L. Very common.

[At Port Bou this species was seen to be devoured by
Dasyopogon diadema ♀. (Trans. Ent. Soc. Lond., 1902,
 p. 335.) E. B. P.]

EUMENES COARCTATA, L. Common.

RHYNCHIUM OCULATUM, F.

1901. Barcelona: *July* 16.—2 ♀ E. B. P., 1 ♂ A. H.
 Monistrol: *July* 13.—1 ♀ E. B. P.

ODYNERUS OPACUS, Mor.

1901. Barcelona: *July* 16.—1 ♀ A. H.

ODYNERUS DANTICI, Rossi.

1901. Barcelona: *July* 13.—2 ♂ E. B. P., 3 ♂, 1 ♀
 A. H. *July* 16.—4 ♀ E. B. P., 1 ♂, 1 ♀
 W. H., 3 ♂, 5 ♀ A. H.

ODYNERUS DANTICI, var.

1901. Montserrat, Hospederia to San Geronimo
 (3000-4000 ft.): *July* 15.—2 ♂ E. B. P.,
 2 ♂ A. H.
 1902. La Granja: *July* 23.—3 ♂.
 El Escorial: *July* 28.—1 ♀.

ODYNERUS PARVULUS, Sauss., var. (?) ♂.

1901. Port Bou: *June* 24.—1 ♂ A. H.
 1902. La Granja: *July* 23.—2 ♂.
 El Escorial: *July* 28.—2 ♂.

In these specimens all the segments are bordered with
 yellow, and the antennæ are pale beneath.

ODYNERUS SIMPLEX, Fab.

1901. Barcelona: *June* 25.—1 ♂, 1 ♀ E. B. P.
July 16.—1 ♀ E. B. P., 4 ♀ A. H.
 1902. El Escorial: *July* 28.—1 ♀.

ODYNERUS ELEGANS, Wesm.

1901. Montserrat, near Railway Terminus: *July* 14.
—1 ♀ E. B. P.

ODYNERUS SPIRICORNIS, Spin.

1902. La Granja: *July* 20.—1 ♂, 8 ♀. *July* 22.—
1 ♂, 1 ♀.

ODYNERUS PARIETUM, L.

1901. Port Bou: *June* 24.—1 ♂ A. H.
Barcelona: *July* 13.—1 ♂ E. B. P., 1 ♂
A. H. *July* 16.—2 ♂ A. H.
Montserrat, near Railway Terminus: *July* 14.
—2 ♀ E. B. P.
Montserrat, Hospederia to San Geronimo
(3000–4000 ft.): *July* 15.—3 ♂ A. H.
Montserrat, near summit, San Geronimo
(about 4000 ft.): *July* 15.—1 ♂ E. B. P.

ODYNERUS ALPESTRIS, Sauss.

1901. Montserrat, Hospederia to San Geronimo
(3000–4000 ft.): *July* 15.—1 ♀ A. H.

PROSOPIS VARIEGATA, F.

1901. Cerbère: *July* 17.—1 ♂ E. B. P.
Monistrol: *July* 16.—1 ♀ A. H. Var. with
white central line on clypeus.
1902. La Granja: *July* 24.—1 ♀. Var. with clypeus
spotted. *July* 26.—1 ♂.

PROSOPIS PICTUS, Smith.

1901. Barcelona: *July* 13.—1 ♀ E. B. P., 3 ♂
W. H., 2 ♂ A. H. *July* 16.—1 ♀ A. H.

PROSOPIS COMMUNIS, Nyl.

1902. La Granja, Palace Grounds: *July* 20.—1 ♀.

PROSOPIS SULPHURIPES, Grib.

1901. Montserrat, near Railway Terminus: *July* 14.
—1 ♂ E. B. P. *July* 15.—1 ♀ A. H.
Montserrat, Hospederia to San Geronimo
(3000–4000 ft.): *July* 15.—1 ♀ E. B. P.

PROSOPIS HYALINATUS, Sm.

1901. Montserrat, near Railway Terminus: *July 14*.
—1 ♂, 1 ♀ A. H.
Montserrat, Hospederia to San Geronimo
(3000–4000 ft.): *July 15*.—2 ♀ E. B. P.
1902. La Granja: *July 23*.—1 ♂, 1 ♀.
Segovia: *July 27*.—1 ♂.

PROSOPIS, sp. near GENALIS, Thoms., n. sp. (?).

1901. Montserrat, near Railway Terminus: *July 14*.
—1 ♀ E. B. P.

PROSOPIS CLYPEARIS, Schk.

1901. Montserrat, near Railway Terminus: *July 14*.
—1 ♀ E. B. P., 2 ♂ A. H.
Montserrat, Hospederia to San Geronimo
(3000–4000 ft.): *July 15*.—2 ♀ E. B. P.

PROSOPIS PICTIPES, Nyl.

1901. Port Bou: *June 24*.—1 ♂ A. H.
1902. La Granja: *July 23*.—1 ♂.

PROSOPIS BISINUATUS, Forst., *angustatus*, Schk., var. (?).

1901. Barcelona: *June 25*.—1 ♂ A. H. *July 13*.
1 ♂ W. H., 5 ♂ A. H.

Differs from *angustatus* in the thinner antennal scape, and is apparently quite distinct, but a similar difference occurs between *brevicornis* and *imparilis*, which makes one doubt if in both cases there may not be two distinct varietal forms.

PROSOPIS IMPARILIS, Forst., *brevicornis*, var. (?).

1901. Cerbère: *July 17*.—1 ♂ E. B. P., 1 ♂ A. H.

COLLETES LIGATUS, Er.

1901. Port Bou: *June 24*.—1 ♀ W. H., 1 ♂ A. H.
Montserrat, Hospederia to San Geronimo
(3000–4000 ft.): *July 15*.—1 ♂ E. B. P.
Montserrat, near summit, San Geronimo
(about 4000 ft.): *July 15*.—1 ♀ W. H.

COLLETES, sp. (?). Small, short genæ, very finely-punctured 2nd abdominal segment.

1902. La Granja: *July* 23.—4 ♀. *July* 24.—2 ♀.

The species of this genus are at present in such a confused state that it is useless to describe any as new from females only; the males have been carefully worked, for such species as were known to him, by the Rev. F. D. Morice (Trans. Ent. Soc., 1904, pt. I), but their respective females are in many cases quite unrecognized, and until the many described males can be associated with suitable females it would only be complicating synonymy to give new names to members of the latter sex.

COLLETES PICISTIGMA, Thoms.

1901. Montserrat, Hospederia to San Geronimo (3000–4000 ft.): *July* 15.—1 ♂ A. H.

Ditto, sp. (?). Large, short genæ, near *picistigma* (?).

1902. La Granja: *July* 24.—1 ♀.

COLLETES FODIENS, Kirb.

1902. La Granja: *July* 23.—1 ♂. *July* 24.—1 ♀.
July 26.—2 ♀.

COLLETES ABEILLEI, Per. MS.

1901. Montserrat, Hospederia to San Geronimo (3000–4000 ft.): *July* 15.—2 ♂, 1 ♀ E. B. P.
Montserrat, near summit, San Geronimo (about 4000 ft.): *July* 15.—1 ♂ W. H.

SPHECODES FUSCIPENNIS, Germ.

1901. Barcelona: *June* 25.—1 ♀ A. H.
Montserrat, near summit, San Geronimo (about 4000 ft.): *July* 15.—2 ♂ E. B. P., 1 ♂ A. H.

SPHECODES GIBBUS, L.

1901. Montserrat, near summit, San Geronimo (about 4000 ft.): *July* 15.—6 ♂, 1 ♀ E. B. P.,
2 ♂ W. H., 3 ♂ A. H.

1902. La Granja: *July* 26.—1 ♂ (being devoured by *Dasygogon dialema* ♀).

SPHECODES SUBQUADRATUS, Sm.

1901. Montserrat, near Railway Terminus : *July 15.*
—1 ♂ E. B. P., 1 ♀ A. H.

Montserrat, near summit, San Geronimo (about
4000 ft.): *July 15.*—9 ♂ E. B. P., 3 ♂
W. H., 6 ♂ A. H.

SPHECODES RETICULATUS, Thoms.

1901. Montserrat, near summit, San Geronimo (about
4000 ft.): *July 15.*—16 ♂, 2 ♀ E. B. P., 22 ♂,
1 ♀ (one of the males being eaten by spider
on yellow umbelliferous flower-head), W. H.,
14 ♂ A. H.

Montserrat, near Railway Terminus : *July 15.*
—1 ♂ A. H.

SPHECODES RUFIVENTRIS, Pz.

1901. Montserrat, near Railway Terminus : *July 15.*
—1 ♂ A. H.

Montserrat, near summit, San Geronimo
(about 4000 ft.): *July 15.*—2 ♂ E. B. P.,
1 ♂ W. H.

Ditto, sp. (?).

1901. Montserrat, near Railway Terminus : *July 15.*
—1 ♀ A. H.

[The five first-named species of *Sphcodes* are indistinguishable in the field. They fly together, and were all found visiting the flowers in the open grassy valley just below San Geronimo, close to the summit of Montserrat, on July 15, 1901. It will be seen that *S. fuscipennis* and *S. rufiventris* were much less common than the others. The abundance of these Aculeates, as well as their intimate association with one another and with their mimics, is well shown in the following experience. I observed resting on a flower in the valley a black fly with red abdomen, beautifully mimetic of these Hymenoptera. Mr. E. E. Austen kindly informs me that the species is the Tachinid, *Ocyptera brevicornis*, Lw. It occurred to me that by a single strong sweep of the net I should probably secure not only the mimic but a number of its models as well. The twenty-one insects thus captured were carefully labelled and kept distinct from others. With the exception of the fly all are Aculeates, and they are of course

included in the numbers given in the present memoir. Separated out from other captures of the same species the list is as follows:—

<i>Sphcodes fuseipennis</i>	. . .	1 ♂
„ <i>gibbus</i>	. . .	3 ♂
„ <i>subquadratus</i>	. . .	7 ♂
„ <i>reticulatus</i>	. . .	7 ♂
„ <i>rufiventris</i>	. . .	1 ♂

The mimetic fly—

<i>Ocyptera brevicornis</i>	. . .	1
		<hr/>
		20
		<hr/>

The twenty-first insect was the only specimen of *Epeolus productus* (♀) in the material described in this paper.

The whole of the captures made by the three naturalists on that sunny afternoon by San Geronimo afford the material for a much larger group, including far greater numbers of the same species of *Sphcodes* and some additional species of Aculeates with the same general appearance. This complete group is shown below. In the right-hand column will be found a record of all other captures of the constituent species in Spain during the same expedition (1901).

A glance at the table on p. 646 suggests the following conclusions:—

(1) *Sphcodes reticulatus* was the dominant species on July 15, while three out of the five species of *Sphcodes* were far more abundant than any other members of the entire group.

(2) There was an evident special association of the species of the group in the locality at San Geronimo. A large proportion of them were not taken elsewhere.

(3) The elevation had obviously delayed the emergence of the species of *Sphcodes*, so that hardly any females had as yet appeared. The proportion of the sexes only 1000 feet lower was very different.

Mr. Edward Saunders tells me that “with few exceptions the males of *Sphcodes* precede the females by a week or so. In the autumn when both are out the females are found more round the burrows and not so much on the flowers as in the spring. The new females hibernate and the males die off.”

(4) It is probable that the stingless males of Aculeates

Synposematic species of <i>Sphécodes</i> .	Group captured below San Geronimo, near summit of Montserrat (about 4000 feet), July 15, 1901.	Other examples of same species captured elsewhere in Spain, June—July, 1901.
	<i>Sphécodes fuscipennis</i> . 3 ♂.	1 ♀, Barcelona, June 25.
	" <i>gibbus</i> . 11 ♂, 1 ♀.	
	" <i>subquadratus</i> . 18 ♂.	1 ♂, 1 ♀, Montserrat, ab. 3000 ft., July 15.
	" <i>reticulatus</i> . 52 ♂, 3 ♀.	1 ♂, Montserrat, about 3000 feet, July 15.
	" <i>rufiventris</i> . 3 ♂.	1 ♂, Montserrat, about 3000 feet, July 15.
	" sp. ?	1 ♀, Montserrat, about 3000 feet, July 15.
Other Aculeates synposematic with <i>Sphécodes</i> group.	<i>Halictus interruptus</i> . 1 ♂. Male only convergent to <i>Sphécodes</i> .	{ 1 ♀, Montserrat, about 3000 feet, July 14. 7 ♀, Port Bou, June 24.
	<i>Halictus elegans</i> . 1 ♀.	1 ♂, Montserrat, about 3000 feet, July 14.
	<i>Nomada</i> cos. 2 ♀.	
	<i>Osmia fallax</i> . 1 ♂.	
Other Orders of insects mimetic of <i>Sphécodes</i> .	DIPTERA. <i>Ocyptera brevicornis</i> . 1.	

possess some special defence, perhaps by means of a secretion, or the juices of the body. It is difficult otherwise to account for the dominant central species of mimetic groups being composed even temporarily of males, to the almost complete exclusion of females. It must be remembered that tropical *Braconidae* are freely mimicked (P. Z. S., 1902, p. 230), and that an experiment of Mr. Guy A. K. Marshall's indicates that the latter are defended in

the manner suggested above (Trans. Ent. Soc. 1902, pp. 386, 387).

I cannot doubt that a closer attention to the facts of mimicry in the Aculeates would long ago have revealed the insufficiency of the Batesian hypothesis and the necessity of that to which Fritz Müller was driven in 1870. The group on Montserrat may be compared in the closest manner with the synaposematic Neotropical Rhopalocera. The central species, belonging to the genus *Sphcodes*, represent the *Ithomiinae*, usually the dominant members of the South American groups. The genera *Halictus*, *Nomada*, and *Osmia*, similarly represent the convergent *Lycorca*, *Heliconius*, and *Actinote*; while the fly *Ocyptera* may be to some extent paralleled by a Heterocerous mimic, such as *Pericopsis* or *Castnia*.

As regards both groups we may feel the same confidence that the Müllerian explanation of common warning colours accounts for nearly the whole of the facts: as regards both the same uncertainty as to whether some outlying member, such as the fly in one or *Castnia* in the other, may not be a real (Pseudaposematic) mimic in the Batesian sense. In both groups the fact lost sight of by Bates is equally evident, viz. that the mimicry is closest between those members whose special defence is clearest—that just as the mimicry of Ithomiine by Heliconine far transcends the resemblance borne to the former by Danaine, Nymphaline, Pierine, or moth, so the likeness of other Aculeate genera for *Sphcodes* far surpasses that borne by the mimetic Dipteron. In fact, Mr. Saunders speaks of the similarity between the females of some of the small southern species of *Halictus* and *Sphcodes* being so great that he has often to look for structural characters at the apex of the abdomen in order to decide upon the genus. In speaking of this remarkable resemblance the great Hymenopterist, indeed, suggests the probability that *Halictus* and *Sphcodes* arose from a single stock at no distant date. But, however recent this period may be, it is highly improbable that superficial likeness in colour and pattern can be its heritage, inasmuch as a safe distinction can be established by an appeal to comparatively deep-seated structural characters.

This interesting group is only a section of a very large assemblage of Aculeates characterized by a black ground-colour, and the development of more or less red on the abdominal segments. Mr. Saunders has kindly

given me the constitution, in a general way, of this assemblage in the Palæarctic Region. It is as follows:—

FOSSORES.

- Mutilla*: only a few males in an extensive genus.
Scolia: ♀ of one species in a genus of about 20 species.
Sapyga: ♀ of one or two species out of 8 or 10.
Myzine: ♀ of one or two species out of 20 or 30.
Pompilus: both sexes of over 200 described species (probably many are synonymous). More than half the genus.
Salix: many species, but less than half the genus.
Ceropales: one species out of about 5.
Pseudagenia: one species out of 4 or 5.
Astutus: nearly all the species of a small genus.
Tachytes and *Tachysphex*: more than half the species in each of these extensive genera.
Larra: one species only.
Gorytes: a small section only of a genus mostly composed of black and yellow wasp-like species.
Entomosericus: both species.
Mimesa: not far from half of about 15 species.
Sphex: many species of an extensive genus.
Ammophila: many species of an extensive genus.
Alyson (small genus): 2 or 3 species.
Nysson (medium-sized genus): a few species.
Didincis: both species.
Dinctus: 1 species only in genus.
Miscophus: 3 species out of about 10.

ANTHOPHILA.

- Prosopis*: about 5 species out of 60 or 70.
Halictus: 8 or 10 out of 100 or more.
*Sphcodes**: some 20 species or so. Practically the whole genus.
Andrena: about 20 species out of 200 or more.
*Nomada**: nearly half a large genus.
Osmia: a very few out of about 200.
*Dioxys**: most of the species (about 6 or 8).
*Phiarus**, *Pasites**, *Biastes**, *Ammobates**: nearly all the species in these small genera.

The absence of species belonging to the formidable Diploptera is remarkable. A brick-red colour is known on the *basal* segment of the abdomen in several species

* Genera thus marked are known or suspected to be inquiline.

from the Canaries and Madeira, and yellowish-red also in a few European species. It is, however, very little developed, and the effect is quite different from the broad transverse band of the abdomen in *Pompilus*, etc.

This great assemblage of species convergent in colours and pattern can be broken up into many sub-groups, more or less closely welded together by intermediate links. Thus the dark wings and intense black of the species of *Pompilus*, together with the position of their deep red abdominal bands, make a very characteristic sub-group. The black and red species of *Ammophila* form the centre of another, while perhaps the most extensive of all these subordinate associations is that which has *Sphecodes* for its centre—the group of which we had so interesting an experience in the valley below San Geronimo. E. B. P.]

HALICTUS 4-CINCTUS, F.

1901. Port Bou: *June* 24.—1 ♀ A. H.

Barcelona: *July* 16.—1 ♂, 3 ♀ W. H., 1 ♀ A. H.

Montserrat, near summit, San Geronimo (about 4000 ft.): *July* 15.—3 ♂ E. B. P., 4 ♂ W. H., 5 ♂ A. H.

HALICTUS 6-CINCTUS, F.

1901. Barcelona: *July* 16.—1 ♀ W. H.

HALICTUS SCABIOSÆ, Rossi. Common, var. (?) *ochraceovittatus*, Drs.

HALICTUS TETRAZONIUS, Klug.

1901. Port Bou: *June* 24.—1 ♂, 1 ♀ W. H.

HALICTUS PYRENÆUS, Per. (?)

1901. Montserrat, near Railway Terminus: *July* 14.—4 ♀ E. B. P., 3 ♀ W. H., 2 ♀ A. H. *July* 16.—2 ♀ W. H.

Montserrat, Hospederia to San Geronimo (3000–4000 ft.): *July* 15.—1 ♀ W. H.

Montserrat, near summit, San Geronimo (about 4000 ft.): *July* 15.—1 ♀ E. B. P., 2 ♀ W. H.

1902. El Escorial: *July* 28.—1 ♀.

HALICTUS, sp. (?)

1901. Montserrat, near Railway Terminus: *July* 14.—2 ♂ A. H.

Allied to *tetrazonius*, but with the mandibles simple; differs from Perez's description of *pyrenæus* in the short cheeks, and the want of the pencils of hairs at the lateral apices of the 4th ventral segment.

HALICTUS SEPARANDUS, Schmied.

1901. Port Bou: *June* 24.—1 ♀ A. H.
 Cerbère: *July* 17.—1 ♂ E. B. P.
 Montserrat, near Railway Terminus: *July* 14.
 —3 ♂ E. B. P., 1 ♂, 1 ♀ A. H. *July* 16.
 —1 ♂ W. H.
 Montserrat, near summit, San Geronimo
 (about 4000 ft.): *July* 15.—1 ♂ W. H.

HALICTUS PLATYCESTUS, Dours.

1901. Barcelona: *July* 16.—2 ♀ E. B. P., 5 ♀ W. H.,
 1 ♀ A. H.

HALICTUS LEUCOZONIUS, Kirb.

1901. Montserrat, Hospederia to San Geronimo
 (3000–4000 ft.): *July* 15.—1 ♂ W. H.
 Montserrat, near Railway Terminus: *July* 16.
 —1 ♀ W. H.

HALICTUS INTERRUPTUS, Pz.

1901. Port Bou: *June* 24.—2 ♀ E. B. P., 2 ♀ W. H.,
 3 ♀ A. H.
 Montserrat, near Railway Terminus: *July* 14.
 —1 ♀ E. B. P.
 Montserrat, near summit, San Geronimo
 (about 4000 ft.): *July* 15.—1 ♂ W. H.

HALICTUS, sp. (?).

1901. Port Bou: *June* 24.—1 ♀ A. H.

HALICTUS COSTULATUS, K.

1902. La Granja: *July* 22.—1 ♀. *July* 23.—2 ♀.
July 24.—2 ♀. *July* 26.—1 ♀. *July* 26.
 —1 ♂ (being devoured by *Dasygogon*
diadema ♀).
 La Granja, above Palace: *July* 21.—1 ♀.

HALICTUS ELEGANS, Lep.

1901. Montserrat, near Railway Terminus: *July 14.*
—1 ♂ A. H.
Montserrat, near summit, San Geronimo
(about 4000 ft.): *July 15.*—1 ♀ A. H.

This is considered by many authors to be a variety of *cylindricus*, but its elongate face appears to me to separate it easily in both sexes from that species.

HALICTUS CYLINDRICUS, Fab.

1902. La Granja, Palace Grounds: *July 20.*—1 ♀.

HALICTUS MALACHURUS. *

1902. La Granja: *July 23.*—1 ♀ (being devoured
by *Dasypogon diadema* ♀).

HALICTUS BREVICORNIS, Schk.

1901. Montserrat, near Railway Terminus: *July 15.*
—1 ♂ E. B. P.
Montserrat, Hospederia to San Geronimo
(3000–4000 ft.): *July 15.*—1 ♀ E. B. P.,
1 ♀ W. H., 1 ♀ A. H.
Montserrat, near summit, San Geronimo
(about 4000 ft.): *July 15.*—1 ♀ A. H.

HALICTUS MINUTISSIMUS, K.

1901. Montserrat, near Railway Terminus: *July 15.*
—1 ♀ E. B. P.

HALICTUS PUNCTATISSIMUS, Schenck.

1901. Montserrat, near Railway Terminus: *July 14.*
—1 ♀ E. B. P.

HALICTUS DUBITABILIS, E. Saund.

1901. Montserrat, near Railway Terminus: *July 14.*
—1 ♂ E. B. P.

HALICTUS MUCOREUS, Gv.

1901. Port Bou: *June 24.*—1 ♀ W. H., 1 ♀ A. H.
Barcelona: *July 16.*—1 ♂ E. B. P.
Monistrol: *July 16.*—1 ♀ A. H.

HALICTUS GRAMINEUS, Sm.

1901. Cerbère: *July* 17.—1 ♀ E. B. P., 3 ♀ W. H.,
1 ♀ A. H.
Port Bou: *June* 24.—2 ♀ W. H., 4 ♀ A. H.
Montserrat, near Railway Terminus: *July* 14.
—7 ♀ E. B. P., 1 ♀ W. H., 3 ♀ A. H. *July*
15.—1 ♀ E. B. P.
Montserrat, Hospederia to San Geronimo
(3000-4000 ft.): *July* 15.—4 ♀ E. B. P.,
3 ♀ W. H.

HALICTUS GEMMEUS, Drs.

1901. Cerbère: *July* 17.—8 ♀ E. B. P., 7 ♀, 1 ♂ A. H.
Port Bou: *June* 24.—1 ♀ W. H.
Barcelona: *July* 13.—1 ♀ A. H.
Montserrat, near Railway Terminus: *July* 14.
—1 ♀ A. H.
Montserrat, Hospederia to San Geronimo
(3000-4000 ft.): *July* 15.—1 ♀ W. H.

HALICTUS MORIO, Fab.

1901. Montserrat, near Railway Terminus: *July* 14.
—1 ♂, 1 ♀ E. B. P.

HALICTUS LEUCOPUS, Kirb.

1901. Montserrat, near Railway Terminus: *July* 14.
—1 ♂, 1 ♀ E. B. P.

HALICTUS SMEATHMANELLUS, Kirb.

1901. Montserrat, near Railway Terminus: *July* 14.
—1 ♀ A. H. *July* 15.—1 ♀ A. H.

ANDRENA PILIPES, Fab.

1901. Barcelona: *July* 16.—1 ♀ W. H.

ANDRENA FULVICRUS, Kirb.

1901. Montserrat, Hospederia to San Geronimo
(3000-4000 ft.): *July* 15.—1 ♂ A. H.

ANDRENA DISTINCTA, Luc.

1901. Montserrat, Hospederia to San Geronimo
(3000-4000 ft.): *July* 15.—1 ♀ E. B. P.

This agrees exactly with a specimen I have in my collection named some years ago by Prof. Perez.

ANDRENA, sp. (?), *dorsata* group.

1902. La Granja, above Palace: *July 21.*—1 ♀.

ANDRENA ALBOFASCIATA, Thoms.

1902. La Granja: *July 23.*—1 ♀.

NOMADA EOS, Schm.

1901. Montserrat, near summit, San Geronimo
(about 4000 ft.): *July 15.*—2 ♀ A. H.

EPEOLUS PRODUCTUS, Thoms.

1901. Montserrat, near summit, San Geronimo
(about 4000 ft.): *July 15.*—1 ♀ E. B. P.

CERATINA CUCURBITINA, Rossi.

1901. Cerbère: *July 17.*—5 ♀ E. B. P., 5 ♀ W. H.,
8 ♀ A. H.

Barcelona: *July 16.*—1 ♀ W. H.

Montserrat, near Railway Terminus: *July 14.*
—1 ♀ W. H., 1 ♀ A. H. *July 15.*—1 ♀
A. H.

CERATINA ACUTA, Friese.

1901. Cerbère: *July 17.*—1 ♀ E. B. P., 2 ♀ A. H.

CERATINA CYANEA, K.

1901. Cerbère: *July 17.*—1 ♂, 1 ♀ E. B. P., 4 ♂
A. H.

CERATINA CYANEA, K. (?).

1901. Monistrol: *July 16.*—1 ♂ A. H.

This specimen agrees, so far as I can see, essentially
with *cyanea*, K., but it has the tubercles white.

CERATINA CALLOSA, F.

1901. Barcelona: *July 16.*—1 ♀ A. H.

CERATINA CHALCITES, Germ.

1901. Montserrat, near Railway Terminus: *July 14.*
—2 ♀ A. H.

1902. La Granja: *July 26.*—1 ♀.

CERATINA DALLATORREANA, Friese.

1901. Cerbère: *July 17.*—1 ♀ E. B. P.

XYLOCOPA VIOLACEA, L.

1901. Port Bou: *June* 24.—1 ♀ A. H.

XYLOCOPA CANTABRICA, Lep.

1902. La Granja: *July* 20.—2 ♀. *July* 25.—1 ♀.

XYLOCOPA VALGA, Gerst.

1902. La Granja: *July* 20.—1 ♂. *July* 24.—1 ♂.
July 25.—1 ♀

CÆLIOXYS AUROLIMBATA, Foerst.

1901. Barcelona: *June* 25.—1 ♂ E. B. P. *July*
16.—2 ♀ E. B. P.

CÆLIOXYS AFRA, Lep.

1901. Montserrat, Hospederia to San Geronimo
(3000-4000 ft.): *July* 15.—1 ♂ A. H.

CÆLIOXYS CONOIDEA, Ill.

1902. La Granja: *July* 25.—1 ♀.

MEGACHILE LAGOPODA, L.

1901. Barcelona: *June* 25.—1 ♂ A. H. *July* 16.—
1 ♂, 1 ♀ E. B. P., 1 ♀ A. H.

1902. La Granja: *July* 25.—1 ♂.
La Granja (on thistle): *July* 26.—3 ♀.

MEGACHILE WILLUGHBIELLA, Kirb.

1902. La Granja: *July* 25.—1 ♀.

MEGACHILE PILICRUS, Mor.

1902. La Granja: *July* 25.—1 ♂.
El Escorial: *July* 28.—1 ♀.

MEGACHILE MELANOPYGA, Cost.

1901. Barcelona: *July* 16.—1 ♂ W. H.

MEGACHILE SERICANS, Duf.

1901. Cerbère: *July* 17.—1 ♂, 4 ♀ W. H.

MEGACHILE ERICETORUM, Lep.

1901. Barcelona: *June* 25.—2 ♂ E. B. P., 3 ♂ A. H.
July 13.—1 ♂ E. B. P. *July* 16.—1 ♂
E. B. P., 1 ♂ W. H., 4 ♂ A. H.
1902. La Granja: *July* 23.—1 ♂. *July* 25.—2 ♂, 1 ♀.
Segovia: *July* 27.—1 ♂.

MEGACHILE CENTUNCULARIS, L.

1901. Barcelona: *June* 25.—1 ♂ A. H. *July* 13.—
1 ♂ E. B. P., 1 ♂ W. H. *July* 16.—1 ♂,
1 ♀ E. B. P., 1 ♂, 1 ♀ A. H.

MEGACHILE ARGENTATA, F.

1901. Port Bou: *June* 24.—2 ♂ A. H.
Barcelona: *June* 25.—1 ♀ E. B. P. *July* 13.
—2 ♂, 2 ♀ E. B. P., 2 ♂ A. H. *July* 16.—
2 ♂ E. B. P.
Montserrat, near Railway Terminus: *July* 14.
—1 ♀ E. B. P., 2 ♂ A. H. *July* 15.—1 ♀
E. B. P. *July* 16.—1 ♂ W. H.
Montserrat, Hospederia to San Geronimo
(3000–4000 ft.): *July* 15.—1 ♂ A. H.
1902. La Granja: *July* 24.—1 ♀.
Segovia: *July* 27.—4 ♂.

MEGACHILE DORSALIS, Per.

1901. Barcelona: *July* 13.—1 ♂ A. H.

MEGACHILE, sp. (?).

1901. Port Bou: *June* 24.—1 ♂ E. B. P.

MEGACHILE APICALIS, Spin.

1901. Cerbère: *July* 17.—1 ♂, 2 ♀ W. H., 2 ♀ A. H.
Barcelona: *July* 13.—1 ♂ A. H. *July* 16.—
1 ♀ E. B. P., 1 ♂, 1 ♀ A. H.
1902. Segovia: *July* 27.—5 ♂.

LITHURGUS CHRYSURUS, Fonsc.

1901. Barcelona: *July* 16.—1 ♀ E. B. P., 1 ♀ A. H.
1902. Segovia: *July* 27.—2 ♂.

ANTHIDIUM MANICATUM, L.

- 1901.—Cerbère : *July* 17.—1 ♀ W. H.
 Barcelona : *June* 25.—1 ♂ E. B. P., 2 ♂, 7 ♀
 A. H. *July* 16.—1 ♀ W. H., 1 ♂ A. H.
 1902. La Granja : *July* 25.—1 ♂.

ANTHIDIUM CINGULATUM, Ltr.

1901. Barcelona : *July* 16.—1 ♀ W. H.
 1902. La Granja : *July* 25.—1 ♀.
 El Escorial : *July* 28.—1 ♀.

ANTHIDIUM FLORENTINUM, F.

1901. Port Bou : *June* 24.—1 ♂, 2 ♀ W. H.
 Barcelona : *June* 25.—1 ♂ E. B. P., 1 ♂
 A. H. *July* 13.—2 ♀ E. B. P., 1 ♂ W. H.
July 16.—1 ♂, 1 ♀ E. B. P., 1 ♀ W. H.,
 1 ♂, 1 ♀ A. H.

ANTHIDIUM 7-DENTATUM, Ltr.

1901. Montserrat, near Railway Terminus : *July* 14.
 —1 ♂ E. B. P., 1 ♀ W. H. *July* 15.—1 ♂
 E. B. P.
 Montserrat, near summit, San Geronimo
 (about 4000 ft.) : *July* 15.—1 ♀ W. H.

ANTHIDIUM LATREILLEI, Lep.

1901. Cerbère : *July* 17.—2 ♀ E. B. P., 2 ♂, 1 ♀
 W. H., 2 ♂, 2 ♀ A. H.
 Port Bou : *June* 25.—1 ♀ A. H.

ANTHIDIUM OBLONGATUM, Ltr.

1901. Montserrat, near Railway Terminus : *July* 14.
 —2 ♀ E. B. P. *July* 15.—1 ♂ A. H.
 Montserrat, near summit, San Geronimo
 (about 4000 ft.) : *July* 15.—1 ♂, 3 ♀ E. B. P.,
 2 ♂ W. H., 2 ♂ A. H.
 1902. La Granja : *July* 22.—1 ♂.
 Segovia : *July* 27.—1 ♀.

ANTHIDIUM STRIGATUM, Pz.

1901. Cerbère : *July* 17.—1 ♂ E. B. P., 1 ♂ A. H.
 Barcelona : *July* 13.—1 ♀ E. B. P.
 Montserrat, near Railway Terminus : *July* 14.
 —1 ♂ A. H.

ANTHIDIUM BELLICOSUM, Lep.

1901. Montserrat, near Railway Terminus: *July 14*.
—1 ♀ W. H.

STELIS ATERRIMA, Panz.

1901. Montserrat, near Railway Terminus: *July 14*.
—1 ♂ E. B. P., 2 ♂ A. H.
1902. El Escorial: *July 28*.—1 ♀.

STELIS BREVIUSCULA, Nyl.

1902. Segovia: *July 27*.—4 ♀.

ERIADES TRUNCORUM, L.

1902. La Granja: *July 23*.—2 ♂.
Segovia: *July 27*.—6 ♂.

ERIADES CRENULATA, Nyl.

1901. Barcelona: *July 16*.—1 ♀ W. H.
Montserrat, near Railway Terminus: *July 14*.
—1 ♀ A. H.
1902. Segovia: *July 27*.—15 ♂.

The Montserrat female (July 14, 1901) has no proper ventral brush.

OSMIA FALLAX, Per.

1901. Montserrat, near summit, San Geronimo
(about 4000 ft.): *July 15*.—1 ♂ E. B. P.

Hitherto only recorded from Algeria, so far as I know.

OSMIA BIDENTATA, Mor.

1901. Barcelona: *July 16*.—1 ♀ E. B. P.
1902. Burgos, hill below Castle (about 3000 ft.):
July 30.—1 ♀.

OSMIA ADUNCA, Pz.

1901. Port Bou: *June 24*.—7 ♀ A. H.
Barcelona: *July 13*.—2 ♂, 2 ♀ E. B. P.
1902. La Granja: *July 23*.—5 ♀. *July 24*.—1 ♂,
1 ♀.

OSMIA, sp. (?).

1901. Barcelona: *July 13*.—3 ♀ E. B. P., 3 ♀ W. H.

OSMIA ACUTICORNIS, Duf. Perr. (?).

1901. Montserrat, Hospederia to San Geronimo
(3000-4000 ft.): *July 15.*—1 ♀ E. B. P.

OSMIA CERULESCENS, L.

1901. Barcelona: *July 13.*—1 ♀ W. H. *July 16.*—
1 ♀ A. H.
Montserrat, Hospederia to San Geronimo
(3000-4000 ft.): *July 15.*—1 ♂ A. H.

OSMIA AURULENTA, Pz.

1901. Montserrat, near summit, San Geronimo
(about 4000 ft.): *July 15.*—1 ♀ E. B. P.,
1 ♀ W. H., 2 ♀ A. H.

CROCISA RAMOSA, Lep.

1901. Barcelona: *July 16.*—2 ♂, 1 ♀ E. B. P.

PODALIRIUS FULVODIMIDIATA, Dours.

1901. Cerbère: *July 17.*—1 ♂ E. B. P., 4 ♂, 3 ♀
W. H., 1 ♂ A. H.

PODALIRIUS BIMACULATUS, Pz.

1902. La Granja: *July 22.*—1 ♂, 2 ♀. *July 23.*—
1 ♂. *July 24.*—2 ♀.
El Escorial: *July 28.*—1 ♂, 1 ♀.

PODALIRIUS GARRULUS, Rossi.

1901. Cerbère: *July 17.*—1 ♂ W. H., 1 ♀ A. H.
Montserrat, near Railway Terminus: *July 14.*
—2 ♂ E. B. P., 1 ♂ A. H.

PODALIRIUS ALBIGENUS, Lep.

1901. Cerbère: *July 17.*—1 ♂ W. H.
Port Bou: *June 24.*—1 ♂ E. B. P.
1902. La Granja: *July 23.*—4 ♂, 1 ♀. *July 25.*—
1 ♀.

PODALIRIUS 4-FASCIATUS, Vill.

1901. Port Bou: *June 24.*—1 ♀ E. B. P., 1 ♂ W. H.,
2 ♂ A. H.
Barcelona: *June 25.*—1 ♀ E. B. P. *July 13.*
—1 ♀ E. B. P., 1 ♀ A. H. *July 16.*—2 ♂,
2 ♀ E. B. P., 2 ♂ A. H.

PODALIRIUS CRASSIPES, Lep.

1901. Montserrat, near Railway Terminus: *July* 14.
—1 ♂ E. B. P.

Montserrat, Hospederia to San Geronimo
(3000–4000 ft.): *July* 15.—1 ♂ W. H., 3 ♂
E. B. P.

Montserrat, near summit, San Geronimo
(about 4000 ft.): *July* 15.—2 ♂, 1 ♀ A. H.

PODALIRIUS PUBESCENS, F.

1902. La Granja: *July* 23.—4 ♂, 5 ♀. *July* 24.—
4 ♀. *July* 25.—1 ♀.

PODALIRIUS FEMORATUS, Oliv.

1902. La Granja: *July* 20.—1 ♂. *July* 22.—1 ♀.
La Granja: *July* 24.—1 ♂. *July* 25.—1 ♂.

PODALIRIUS RETUSUS, Linn. (?).

1902. La Granja, Palace Grounds: *July* 20.—1 ♀.
July 22.—1 ♀.

The above determination is probable, but the specimens are so faded and weather-beaten that certainty is unattainable.

EUCERA COMMIXTA, D. T.

1902. La Granja: *July* 24.—1 ♀.

PSITHYRUS CAMPESTRIS, Panz.

1901. Montserrat, near summit, San Geronimo (about
4000 ft.): *July* 15.—1 ♂ E. B. P.

BOMBUS SMITHIANUS, White.

1901. Barcelona: *June* 25.—1 ♀ A. H. *July* 13.—
1 ♂, 3 ♀ W. H. *July* 16.—1 ♀ W. H.

BOMBUS AGRORUM, Fab. var.

The males are certainly *agrorum*, and probably therefore the females and workers are varieties of this species.

1901. Montserrat: *July* 14–16.—All forms abundant
wherever the mountain was explored—from
the Railway Terminus to the summit.

BOMBUS AGRORUM, var. PASCUORUM.

1902. La Granja: *July 20.*—1 ♀. *July 22.*—2 ♀.
 Ditto, Palace Grounds: *July 20.*—1 ♀.
 Ditto, above Palace: *July 21.*—5 ♀.

BOMBUS HORTORUM, L.

1901. Port Bou: *June 25.*—1 ♂ W. H., 3 ♂, 1 ♀
 A. H.

BOMBUS HORTORUM, var. (posterior tibiæ red-haired).

1902. La Granja: *July 20.*—1 ♀.
 El Escorial: *July 28.*—2 ♂, 4 ♀.

BOMBUS PRATORUM, L.

1901. Montserrat, near summit, San Geronimo (about
 4000 ft.): *July 15.*—1 ♀ E. B. P.

BOMBUS TERRESTRIS, L.

1901. Barcelona: *July 16.*—1 ♀ W. H.
 Montserrat, near Railway Terminus: *July 13.*
 —1 ♀ E. B. P.

BOMBUS TERRESTRIS, var. FERRUGINEUS.

1901. Port Bou: *June 24.*—Abundant.
 Barcelona: *July 16.*—1 ♀ E. B. P.
 Montserrat, near summit, San Geronimo (about
 4000 ft.): *July 15.*—1 ♂ W. H.
 1902. La Granja: *July 20.*—2 ♀. *July 26.*—1 ♀.
 El Escorial: *July 28.*—2 ♀.

APIS MELLIFICA, L.

Fairly common everywhere.

[Freely devoured by the females, occasionally by the males, of *Dasygogon diadema* at La Granja. (Trans. Ent. Soc. Lond., 1902, p. 336, note.) E. B. P.]

APPENDIX.

The mimicry of Aculeata by the Asilidæ and Volucella, and its probable significance. By E. B. POULTON.

I HAVE already stated that I was much struck with the mimetic resemblance borne by the Asilid captor to its Aculeate prey on July 20, 1902 (see p. 634). The commonest form of the variable female of *Dasygogon diadema* reproduces on a larger scale all the conspicuous features of *Pompilus viaticus*:—the dark wings and the black body with a reddish transverse band across the abdomen. In the case of *Pompilus fuscipennis* there is not even the discrepancy in size, while the resemblance in colour is in some respects even closer; for the red abdominal band is single in the *Pompilus*, and, although spread over three segments, appears to be single in the Asilid. In *P. viaticus*, however, the three constituent bands are evident, separated as they are by intervening black areas. This species of Asilid attacks Aculeates far more frequently than any other kind of prey. I observed it devouring small Coleoptera on several occasions at La Granja, once a Hemipteron, and once the male of its own species. In Switzerland I once captured it with a Tachinid fly (*Sarcophaga* sp., Trans. Ent. Soc. Lond., 1902, p. 334). On all other occasions when I have observed it, including the numerous instances recorded in the present memoir, the prey has been Hymenopterous—almost exclusively Aculeates, but now and then Ichneumons. The fact that the Asilid is a special enemy of the group to which *Pompilus* belongs suggests, at first sight, aggressive mimicry as the plausible interpretation of the resemblance—a likeness which may be supposed to facilitate the approach of the captor to its prey. But the swift and sudden swoop of an Asilid upon its victim does not appear to require any accessory aid; furthermore, there is no evidence that *Pompilus* is attacked above all other Aculeates. As a matter of fact this is the single example I have encountered. A surer interpretation of the resemblance seems to be afforded by protective mimicry—a defence against insect-eating vertebrate animals. The Asilid, seeking its prey, frequents places where Aculeates abound, and therefore an Aculeate is for

it a specially advantageous model, the likeness under such favourable conditions assisting it in the struggle with enemies against which the sting of *Pompilus* would be a defence. The striking and conspicuous colouring of this Aculeate renders it especially suitable as a model. Furthermore, the detailed resemblance may have been built up on a foundation provided by a slightly greater initial resemblance to this rather than any other Aculeate genus.

This appears to be the most feasible explanation of Asilid mimicry as a whole. *Asilidæ* which have no special form of insect prey, but attack indiscriminately, are not as a rule mimetic. Such an exception as our own *Asilus crabroniformis* recalls in a general way the type of Aculeate colouring and pattern which is commonest and most conspicuous in its region, and is probably therefore independent of the advantages due to special association. Neither do we find mimicry prevalent among the *Asilidæ* which exhibit decided preferences, but not in the direction of specially-defended prey, such, for instance, as *Dysmachus trigonus*, which clearly selected a much less abundant beetle (*Rhizotrogus sauzi* (?), Graells), among the swarms of Orthoptera towards the summit of Peñalara, on July 25, 1902. Mimicry, on the other hand, is common among these predaceous Diptera when they attack the Hymenoptera in any special degree. We can probably distinguish two classes of mimetic resemblances among such Asilid flies. In the first we may place *Dasypogon diadema* and the slender ichneumon-like *Dioctrias* which, as Colonel Yerbury has observed (l. c., pp. 332, 333), specially select ichneumons as their prey—in fact, all examples in which the attacks are upon a group rather than upon a particular species. The second class, in which mimicry is even more common and more exact in its details, comprises the *Asilidæ* which specially attack single species of Aculeates, such, for instance, as *Damalina* sp., described by Col. C. T. Bingham as preying upon the model (*Melipona apicalis*), which it resembles with extraordinary precision (l. c., p. 334). Further examples are probably to be found in the *Hyperechias*, which bear so wonderfully perfect a resemblance to the *Xylocopidæ*, and, as is believed, prey upon these Aculeates. Indeed, Mr. E. E. Green has only recently observed one circling round its *Xylocopid* model in Ceylon (Proc. Ent. Soc. Lond., 1904, June 1). It is unfortunate that the

remarkable likeness to such common insects should convey an impression of extreme rarity and lead to a want of knowledge as to habits. Asilid mimicry of this latter kind may be exactly paralleled by resemblances such as that of the Histerid *Saprinus virescens* to its distasteful Phytophagous prey, *Phædon cochleariæ*,—following the convincing interpretation offered by Mr. Horace Donisthorpe (Trans. Ent. Soc. Lond., 1901, p. 354).

The resemblance of the Volucellas for the Aculeates has probably been brought about in a slightly different way, although here too the older interpretation of the mimicry as aggressive must, I believe, be abandoned. My friend Dr. W. Hatchett Jackson has recently presented to the Hope Department a specimen of *Volucella inanis*, which he captured on August 29, 1903, close to the entrance of a wasps' nest in his garden at Pen Wartha, Weston-super-Mare. The wasps paid not the slightest attention to it, although they instantly attacked other insects venturing near the opening. Considering that wasps will detect and kill the individuals from other communities, it is most improbable that they were deceived by the appearance of the *Volucella*. Furthermore, Dr. Jackson has had the opportunity of studying M. Fabre's latest volume, and informs me that the great observer believes *V. inanis* to be a beneficial guest in the wasps' nest, feeding on débris, waste substances, excreta, etc. He also states that the larvæ of these diptera are not attacked even when upon the combs of the wasp. These results entirely accord with observations upon *V. bombylans* carried out by the present writer in association with Miss Cora B. Sanders early in July 1898. Fresh and active specimens of the *Volucella* were lightly but securely girdled with a fine silken thread, the other end being attached to a long slender twig. In this way it was possible to guide the movements of the fly and compel it to wander close to the opening of the underground nest of *Bombus terrestris*, and even to enter the passage. Examples of both the red-tailed form of *V. bombylans* and the banded form (var. *mystacea*) were thus tested, and only once was any antagonism displayed. On this occasion the *Volucella* was made to descend the passage, and thus met an ascending worker. The humble-bee grappled with the fly, wrestled with it in a clumsy manner for a few seconds, and then left it apparently without having caused any injury. We also

witnessed the oviposition of the *banded* variety *mystacea* in the nest of a *red-tailed* carder-bee (*Bombus derhamellus*, Kirb.). The fly hovered round the nest for a few seconds, the bees paying no attention to it. It then alighted on the moss and quickly entered, remaining about *eight* minutes. At the close of this period it emerged, and at once flew away. Opening the moss below the point of its entrance and exit, about fifty or sixty eggs were found in a mass. These were exactly similar to the eggs sometimes laid by captured females of the species of *Volucella*. The fact that a banded fly should have laid in the nest of a red-tailed bee strongly opposes the interpretation of aggressive mimicry, originally offered by Kirby and Spence and followed by the present writer in former publications (*e.g.* "Colours of Animals," London, 1890, p. 267).

Another observation made on the same occasion also opposes the older interpretation. It is well known that the Aculeate models, when disturbed, commonly adopt a warning attitude in which the second leg is raised. On further irritation the whole body is generally tilted over on one side. In the sun *Volucella* is shy and readily takes flight; but on cold days and in the evening it becomes sluggish and semi-torpid. If disturbed in this condition I found that it raises its first leg in a manner clearly mimetic of the first warning position of its *Bombus* model. The anterior legs of flies perform such a variety of operations that selection would here have a comparatively easy task to produce a new movement of a simple kind. At the same time the general likeness of the attitudes is very striking, although different legs are made use of by model and mimic.

The protective value of such a detail in the resemblance of fly to *Bombus* becomes sufficiently obvious, when it is remembered that the position is only assumed at a time of complete helplessness. On the other hand, it is most improbable that an attitude thus assumed could play a part in the aggressive mimicry of the one insect for the other.

The facts now brought forward supply a solid foundation for the criticism of the older conclusions urged, in 1893, by Mr. W. Bateson, F.R.S. ("Nature," 1892, Vol. xlvi, p. 585, Vol. xlvii, p. 77).

It is probable that the *Volucellas*, like the *Asilids*, are protected from insect-eating animals by their mimetic disguise, and that the resemblance of *V. inanis* to wasps

and of *V. bombylans* to the red-tailed and banded humble-bees have been promoted by the special associations which render the models peculiarly feasible in each respective case. These Diptera live in the same habitats as their models, and may be seen visiting the same flowers; they fly from nest to nest to deposit their eggs, and their first flight on emergence from the puparium is made from the home of an Aculeate community. It is obvious that their mode of life bears a strong superficial resemblance to that of their respective hosts, and that mimetic likeness to these hosts would be far more convincing and advantageous than to other species of Aculeates.

Although mimicry is not necessarily dependent on a mode of life which brings an insect into intimate relationship with some widely-different form possessed of special means of defence, yet such associations are very commonly attended by mimicry. In this note it has been seen that mimetic likeness may result when the relationship is that between captor and prey, whether the prey be defended by a sting or by some nauseous quality—that it may result when the association is that of scavenger to an Aculeate host.

E. B. P.

